EXERCISE BEHAVIOUR AMONG MALAYSIAN TEACHER TRAINEES

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ABSTRACT

Physical activity is an effective way for the prevention of diseases and serves as a cost-effective strategy to improve public health across the population. There are strong evidences linking increased regular physical activity with better health. It is evident that individuals who are able to maintain a regular routine of activity long enough or more vigorously in intensity are likely to benefit more and have less risk of death. Despite the recognized psychological, physical and social benefits of regular exercise, physical inactivity continues to be extensive. The proportions of the Malaysian population who participate in regular and sustainable physical activity remain significantly small. Teacher training plays a very important role in producing teachers that are high in physical activity and can be role models to their students. Hence, this study aimed to find out whether the lack of physical activity is also found among Malaysian teacher trainees. First, the characteristics associated with the different stages of exercise behaviour change of teacher trainees in Malaysia were examined. An integrative model was developed by combining personal psychological variables identified from the Transtheoretical Model (Self-efficacy, Decisional Balance, Processes of Change) with the Physical Self-Perception to examine its applicability to better understand exercise behaviour. Seven hundred and fifty four responses were collected from teacher trainees selected through cluster random sampling from eight Teacher Education Institutes. The hypothesized model of exercise behaviour was assessed using the Structural Equation Modelling (SEM) statistical procedure. The measurement models that define the relations between the observed (indicator) variables and the unobserved (latent) variables were first assessed. The full structural model was tested only after all the measurement models underlying the structural model have been confirmed through confirmatory factor analysis (CFA).

In the present study, it is found that slightly over one third (34.4%) of the teacher trainees were actively participating in physical activity, while slightly more than half (56.4%) of the participants were only moderately active in physical activity. Gender, age and ethnicity are some of the personal determinant factors on physical activity. However, gender and ethnicity (culture) seem to have greater impact in influencing physical activity than age in the current study. Male teacher trainees demonstrated a higher level of physical activity, weekly leisure time exercise score, self-efficacy, benefits of exercise (Pros), and higher usage of the processes of change. In term of ethnicity, there was no significant difference between the Malay and the Indian participants, but the Chinese participants have lower self-efficacy, low perceived benefits of exercise, and lower physical self-perception but have higher perceived costs for exercise when compared with the Malay and Indian participants. Hence, it can be surmised that ethnicity was an important factor in determining the exercise behaviour.

The results of this study also demonstrated that Self-Efficacy, Perceived Benefits of Exercise, and Physical Self-Perceptions were indirectly related to physical activity being mediated by the Stages of Exercise Change. The only construct that influenced physical activity directly was the Processes of Change for Exercise. Among the implications of this study is that any intervention efforts should include emotions management so that their sense of self-efficacy to exercise is enhanced, while improving physical self-perception and exercise behaviour should be performed simultaneously. It is recommended that future research should also examine cultural differences in exercise behaviour and its interpretation at individual and societal levels.

ABSTRAK

Aktiviti fizikal adalah cara yang berkesan untuk mencegah penyakit dan juga sebagai suatu strategi yang kos efektif bagi meningkatkan kesihatan dalam kalangan penduduk. Terdapat bukti-bukti yang kukuh yang mengaitkan aktiviti fizikal yang kerap dengan kesihatan yang lebih baik. Individu-individu yang dapat mengekalkan aktiviti fizikal dalam tempoh masa yang mencukupi atau melakukannya dengan lebih rancak akan memperolehi lebih manfaat malah dapat mengurangkan risiko kematian. Meskipun terdapat pengiktirafan tentang faedah psikologi, fizikal dan sosial dari senaman yang kerap, ketidakaktifan dalam kegiatan fizikal masih berleluasa. Peratus penglibatan penduduk Malaysia dalam aktiviti fizikal yang kerap masih amat rendah. Latihan perguruan memainkan peranan yang amat penting dalam menghasilkan guru yang aktif dalam aktiviti fizikal serta boleh menjadi contoh teladan kepada pelajar-pelajar mereka. Oleh itu, kajian ini bertujuan untuk menyelidik sama ada kekurangan aktiviti fizikal juga wujud dalam kalangan guru pelatih di Malaysia. Terlebih dahulu, ciri-ciri yang dikaitkan dengan pelbagai peringkat perubahan tingkah laku senaman dalam kalangan guru-guru pelatih di Malaysia dikaji. Satu model integratif dibentuk dengan menggunakan pembolehubah-pembolehubah sosio-psikologi peribadi (Efikasi-Kendiri, Imbangan Keputusan, Proses-proses Perubahan) yang dikenal pasti dari Model Transteoretikal dengan Persepsi Fizikal Kendiri bagi memeriksa kebolehgunaannya untuk lebih memahami tingkah laku senaman. Sejumlah tujuh ratus lima puluh empat responden telah dipilih dari guru-guru pelatih melalui persampelan rawak kelompok di lapan buah Institut Pendidikan Guru. Model tingkah laku senaman yang dihipotesiskan dinilai menggunakan prosedur statistik Permodelan Persamaan Berstruktur (SEM). Model pengukuran yang mentakrifkan hubungan antara pembolehubah yang diperhatikan (penunjuk) dan pembolehubah yang tak diperhatikan (pendam) terlebih dahulu dinilai.

Model struktur sepenuhnya diuji hanya selepas semua model pengukuran yang mendasari model struktur telah disahkan melalui analisis faktor pengesahan (CFA).

Dalam kajian ini, hampir satu pertiga (34.4%) daripada guru pelatih aktif dalam aktiviti fizikal, manakala lebih daripada separuh (56.4%) responden hanya sederhana aktif dalam aktiviti fizikal. Jantina, umur dan etnik adalah antara faktor penentu peribadi aktiviti fizikal. Walau bagaimanapun, jantina dan etnik (budaya) mempunyai impak yang lebih besar mempengaruhi penyertaan dalam aktiviti fizikal berbanding dengan faktor umur dalam kajian ini. Guru pelatih lelaki menunjukkan tahap yang lebih tinggi dari segi aktiviti fizikal, jumlah masa menjalankan riadah mingguan, efikasi-kendiri, persepsi kemanfaatan senaman, serta penggunaan yang lebih tinggi dalam proses perubahan. Dari segi etnik, tiada perbezaan yang signifikan di antara responden Melayu dengan responden India. Sebaliknya peserta Cina adalah rendah dari segi efikasi-kendiri, rendah dalam persepsi kemanfaatan senaman, dan rendah dari persepsi fizikal kendiri tetapi mereka mempunyai persepsi yang lebih tinggi terhadap halangan dalam senaman apabila dibandingkan dengan peserta Melayu dan India. Oleh itu, boleh disimpulkan bahawa aspek etnik merupakan faktor penting dalam menentukan tingkah laku senaman. Dapatan kajian ini juga menunjukkan hubungan Efikasi-Kendiri, Persepsi Kemanfaatan Senaman serta Persepsi Fizikal Kendiri adalah secara tidak langsung dengan Aktiviti Fizikal dan diantarai oleh Peringkat Perubahan Tingkahlaku Senaman. Hanya konstruk Proses Perubahan Senaman mempengaruhi aktiviti fizikal secara langsung. Antara implikasi dari kajian ini adalah usaha intervensi harus menjurus kepada didikan pengurusan pengawalan emosi agar efikasi-kendiri dapat dipertingkatkan. Manakala usaha mempertingkatkan Persepsi Fizikal Kendiri dan tingkahlaku senaman perlu dilakukan secara serentak. Adalah disarankan agar penyelidikan di masa depan turut mengkaji tingkahlaku senaman dari segi perbezaan budaya dan penafsirannya di peringkat individu dan masyarakat.

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Kee Kang Mea

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LIST OF SYMBOLS AND ABBREVIATIONS

Symbols/Abbreviation	Definition
ANOVA	Analysis of variance
d	Cohen's measure of sample effect size for comparing two sample means
df	Degrees of freedom
%	Percentage
f	Frequency
F	F distribution
MANOVA	Multivariate analysis of variance
MS	Mean square
n	Number of cases in a subsample
N	Total number of cases
η_p^2	Partial Eta squared
R^2	Multiple correlation squared; measure of strength of association
SD	Standard deviation
x^2	The chi-square distribution; a statistical test based on the chi-square distribution
PAL	Physical Activity Level; measured through Godin's Weekly Leisure-Time Exercise questionnaire
SEC	Stages of Exercise Change
SE	Self-Efficacy for Exercise
Pros	Perceived Benefits of Exercise
Cons	Perceived Costs of Exercise
C-POC	Cognitive Processes of Change
B-POC	Behavioural Process of Change
POC	Processes of Change
PSP	Physical Self-Perception

CHAPTER 1

INTRODUCTION

1.0 Introduction

The importance of leisure-time physical activity particularly in sedentary population cannot be denied and has been well documented and accepted worldwide (Institute for Public Health, 2008; Keating, Jianmin, Pinero, & Bridges, 2005; Kim, 2007; Leslie, Sparling, & Owen, 2001). Participation in sweat inducing physical activity and healthy sports are essential and served as one of the key ingredients of a healthy lifestyle and the well-being for most people. Routine practice of appropriate physical activity and sports provide people with many benefits such as physical, social and mental health benefit (Berger, Pargman, & Weinberg, 2002; WHO, 2003). Individually, physical activity acts as a very successful way for the prevention of diseases and to a nation, it serves as a cost-effective strategy to enhance public wellbeing across the population (WHO, 2003).

Both clinical and epidemiological studies have consistently acknowledged the important relationship between physical activity and overall wellbeing. While the risk of death from infectious diseases has decreased significantly over the years due to scientific advances and improvements in medicine and health care, deaths through non-communicable diseases (NCD) is on the rise (Ministry of Health Malaysia, 2006). In other words, the major causes of early death have shifted from infectious diseases to hypokinetic diseases such as cardiovascular disease, adult-onset diabetes and obesity (Corbin, Welk, Lindsey, & Corbin, 2004). Evidently, heart disease remains the number one killer in the United States (Kung, Hoyert, Xu, & Murphy, 2008) and sedentary

lifestyle is said to be one of the major causes accountable for the dangerous prevalence of cardiovascular disease (American Heart Association, 2002).

In Malaysia, the prevalence of diabetes and hypertension has been on an increasing trend. Comparison of findings from the first National Health Morbidity Survey (NHMS I) conducted in 1986 with the second National Health Morbidity Survey (NHMS II) in 1996 (Institute for Public Health, 1999) indicated that the occurrence of hypertension has increased from 14.4% to 29.9%. Similarly, the prevalence of diabetes has increased from 6.3% to 8.3% for the same period.

There are strong and growing evidences linking the increased regular physical activity with better health; individuals who are able to sustain a regular routine of activity that is long enough or more vigorous in intensity are likely to benefit more and have less risk of death from most causes (Anderson, Schnohr, Schroll, & Hein, 2000; Blair et al., 1995; U.S. Department of Health and Human Services, 1996). Physical activity has been positively linked with cardiovascular health (Blair, Wells, Weathers, & Paffenbarger, 1994; Fletcher et al., 1996), body composition, and body weight (Ball, Owen, Salmon, Bauman, & Gore, 2001), cancer (American Cancer Society, 2003), musculoskeletal fitness (U.S. Department of Health and Human Services, 1996; Vuori, 1995) and bone health (Blair et al., 1994; U.S. Department of Health and Human Services, 1996). The U.S. Department of Health and Human Services (1996) reported that physical activity need not be exhausting to attain health benefits and most individuals can considerably enhance their health and quality of life by being moderately active on a regular basis. Professionals in exercise science and health experts concur that people can achieve significant health benefits by including a moderate amount of physical activity on most, if not all, days of the week. It is found that a person who is fit physically has greater capability to endure the physical challenges of daily life and thus he or she is less likely to suffer from chronic diseases.

Developing habitual physical activity such as exercising regularly can also positively influence the overall psychological well-being of an individual. Engaging in regular exercise is said to enhance self-esteem (Langemo, Volden, Oechsle, & Adamson, 1990), decrease anxiety (Petruzzello, Landers, Hatfield, & Salazar, 1991 ; U.S. Department of Health and Human Services, 1996), improve mood state (Arent, Landers, & Etinier, 2000; U.S. Department of Health and Human Services, 1996), and reduce depression (Craft & Landers, 1998). In brief**,** being physically fit and psychologically healthy make anyone feel great about his or her body and mind (Stathi, Fox, & McKenna, 2002). Through a lifelong practice of moderate physical activity, most people of all ages can improve their health and quality in both the physical and psychological aspects of life.

However, despite the recognized psychological, physical and social benefits of regular exercise, physical inactivity continues to be extensive. The ratio of the population who participate in regular, sustained physical activity remained significantly small (Berger et al., 2002). The statistics of the U.S. Department of Health and Human Services (1996) showed that almost 25% of the U.S. adult population is sedentary, and only 22% of the adult population engage in sustained physical activity regularly (five times a week for at least 30 minutes). This indicated that less than one in four Americans exercises on a regular basis to achieve health benefits. In our local context, findings from a survey funded by the Ministry of Health, Malaysia known as the Malaysian Adult Nutrition Survey (MANS) conducted in 2003 found that overall, only about 14.43% of the Malaysian adults exercise adequately for at least three times per week at 15 minutes per session, out of which 19.94% were men and only 9.13% were women (Ministry of Health Malaysia, 2007). A more recent nationwide survey, the first Malaysia Non-communicable Disease (NCD) Surveillance 2005/2006 (Ministry of Health Malaysia, 2006) found that more than 7.2 million or 60.1% of the population

between the ages of 25 to 64 year old was physically inactive (achieving less than 600 MET-min/week). What is more alarming is that 34% of this physically inactive population was from the youngest age-group (25-34 year old). The most recent national health morbidity survey conducted by the Ministry of Health Malaysia in 2006 (Institute for Public Health, 2008) showed that overall the prevalence of physical inactivity among Malaysian adults was at 43.7% with female showing higher inactivity level at 50.5% and male at 35.3%. In addition, it has been reported that those who do begin a physical activity programme, 50 % will drop out within the first three to six months (Carmody, Senner, Manilow, & Matarazzo, 1980; Dishman, 1988).

WHO (2003) reported that worldwide, as high as 1.9 million deaths was due to physical inactivity with about 10-16% of cases each from breast cancer, colon and rectal cancers and diabetes mellitus, and about 22% of ischemic heart disease. The risk of getting cardiovascular disease is also reported to increase to 1.5 times in individuals who do not follow the minimum physical activity recommendations. The report further highlighted that more than 60% of adults worldwide do not involve in adequate amount of physical activity for maintaining sound fitness. In addition, women, older adults, individuals from low socio-economic groups, and the disabled are at higher risk of physical inactivity.

Physical activity is also found to decrease with age during adolescence (Schoenborn, 1986 ; van Mechelen & Kemper, 1995; WHO, 2003), and this decline of physical activity carry on throughout the adult years (WHO, 2003). Similarly in Malaysia, findings from both National Health Morbidity Survey II in 1996 (Institute for Public Health, 1999) and National Health Morbidity Survey III in 2006 (Institute for Public Health, 2008) also indicated that physical activity level decline with age. Concurrently, female adolescents have been found to be less active than male adolescents (Sallis, 1993; Sallis & Owen, 1999).

In many developing and developed countries, fewer than a third of young people are adopting adequately active lifestyle in order to reap the benefits of physical activity for their immediate and future well-being (WHO, 2003). This same scenario is also a cause of concern in the Malaysian perspective. The NHMS II (1996) reported that only 25% of the female participants were active in physical exercises compared to 37.8% of their male counterpart (Institute for Public Health, 1999). However, based on the NHMS III (2006) report, the participation in exercise**s** during leisure time has since declined further for both gender to only 10.7% for female and 18.% for male (Institute for Public Health, 2008). The above findings indicated clearly that more Malaysians are less active physically and in view of the higher female population in Malaysia, it is therefore evident that the Malaysian health authority has to be more watchful, concerned and receptive to the existence of such an unhealthy trend among the citizens.

1.1 Background of the Study

Marsh, Papaioannou and Theodorakis (2006) stated in their study that "some of the aims of physical education in school settings are to reinforce student participation in health-related physical activity outside of school and to help students to develop lifelong healthy lifestyles" (p. 317). Although the teachers and the physical education programmes in schools are in a unique position to help students participate in health-related physical activity and develop lifelong healthy lifestyles, very little is known about how effective they are at accomplishing it.

Pre-service teachers or teacher trainees are being provided with the content and pedagogical skills through the teachers' training programmes and eventually be expected to be able to educate, instruct, motivate, and guide their future students in various subjects including physical education. Concurrently, they are also expected to promote to their students the practice of exercise and physical activities as a daily

routine through the school physical education curriculum. Once the teacher trainees have completed the teacher training programme, they are assumed to be competent to teach physical education in schools and hence help in enhancing physical fitness among their students. However, several studies (Ministry of Education Malaysia, 1982, 1990, 1993) suggested that this might not really be the case. Even though all pre-service teachers or teacher trainees are required to undergo physical education classes as partial fulfilment of the teaching curricular requirements, some may not attain the competency required for effective teaching of physical education as this subject involves fitness, skills and sports inclination. It is further supported by several studies conducted by the Federal Inspectorate of Schools that female physical education teachers lack sport skills (Ministry of Education Malaysia, 1982) while the untrained physical education teachers possessed less confidence to teach physical education effectively (Ministry of Education Malaysia, 1990, 1993).

In another study, Wee (2001) found that only 15.2% of the physical education teachers actually majored in the subject. This shows that the majority of the physical education classes in schools are being taught by teachers who are not majoring in physical education. The main reason why the majority of the physical education classes in schools are being taught by teachers who are not physical education trained is due to inadequate number of physical education major teachers (Wan Hasmah & Zainun, 2002; Wee, 2008).

Therefore, under the current circumstances, the implementation and the success of physical education programmes in Malaysia, in both the primary and secondary schools are greatly dependent on the non-physical education major teachers. Consequently, it is a challenge for teacher educators in the Teacher Education Division, Ministry of Education to train teacher trainees who are not only effective in teaching

their subject specialization but also are equally effective in the teaching of physical education.

1.2 Statement of the Problem

Effective physical education teachers use a variety of pedagogical skills and strategies to ensure their students to actively engage in the relevant activities. One of the strategies for effective teaching of physical education is the ability to be positive role model to their students. In relation to the effectiveness of teaching physical education, numerous studies have revealed that teachers who are physically active are able to provide better quality of physical education lessons to their students (LaMaster, Mckenzie, Marshall, & Sallis, 1998; McKenzie, LaMaster, Sallis, & Marshall, 1999). In other words, the active teachers are effective in teaching physical education because they are good role models to their students through good fitness behaviour. Therefore, the teachers themselves must lead a physically active lifestyle through participation in health-related physical activity in order to become good role models for effective teaching.

Another study by Melville and Maddalozzo (1988) on the effects of physical educator appearance found that students tend to be less attentive to subject matter and doubted their teachers' level of knowledge in fitness when these teachers do not demonstrate good role model. This is because they believe that physical educators should have good fitness appearance for effective teaching. Whitley, Sage and Butcher (1988) in support of the significance of role modelling in the teaching of physical education stated that " … the importance of strong, positive, and effective role modelling by teachers in creating and reinforcing desired behaviour is well known and widely accepted and is especially critical for successful instruction in physical education" (p. 81).

According to Clark, Blair, and Culan (1988), the high regard that educators hold towards good health habits may lead to positive role modelling for their students. Hence, it is important for teachers to provide active physical education classes and to be positive examples of healthy living to their charges. Therefore, in order for the teachers to inculcate positive attitude among students towards physical activity, they themselves must first be exemplars of the desired healthy lifestyle and are able to take charge of their own habitual physical activity. Right from the beginning as teacher trainees, they must demonstrate healthy behaviours to ensure the healthy state of their own physical condition and at the same time have the ability to encourage active participation in physical activities of their students.

It is a well-known fact that most school children spend a large amount of their time at school (six years in primary schools and another five to six years in secondary schools) interacting closely with the teachers. Consequently, teachers possess the immense opportunities in shaping and reinforcing the desired behaviour in children such as participating actively in physical activity and other sports programmes. Hence, school teachers regardless of their subject specialization are regarded as an important driving force of change and transformation because they are entrusted with the responsibilities to instil healthy behaviours among students. These responsibilities include encouraging their students to actively participate in physical activities both in and outside schools.

However, very little is known about the Malaysian teachers specifically the teacher trainees of their ability to be good role model to their students with regard to the promotion of active physical lifestyles. Our knowledge about the Malaysian teacher trainees' exercise behaviour is somewhat limited. Few studies have actually looked into the exercise behaviour of the teachers. In brief, very little is known about their self-efficacy, decision making (decisional balance) and usage of the processes of change

in exercise. Therefore, knowing the exercise behaviours among the pre-service teachers are important, as numerous studies have indicated that physically active teachers (good role model) are more effective physical education teachers (LaMaster et al., 1998; Melville & Maddalozzo, 1988; Whitley et al., 1988).

In seeking to understand better the exercise behaviour change in young people, numerous studies (Maddison & Prapavessis, 2006; Nigg & Courneya, 1998; Prapavessis, Maddison, & Brading, 2004) have employed the Transtheoretical Model (TTM). The TTM is an integrative model of intentional behaviour change, which exemplifies how people attain a positive behaviour or change a negative behaviour. The TTM has been identified as one of the most commonly applied behaviour-prediction models in the exercise domain. Studies using the TTM (Callaghan, Khalil, & Morres, 2010; Kim, 2004; Nigg & Courneya, 1998) have revealed that self-efficacy, decisional balance and processes of change were the strongest discriminators of exercise stage readiness.

Self-efficacy

One of the more prevailing variables of interest in understanding the exercise behaviour is self-efficacy. Self-efficacy is the perception of a person about his or her own capacity to act out a specific behaviour. In the perspective of physical activity, self-efficacy represents the perceptions of individual efficacy or confidence in one's ability to adopt regular physical activity (Nahas, Goldfine, & Collins, 2003). A person can have high self-efficacy about his or her ability in performing a certain activity, yet can be of low self-efficacy in carrying out another activity. In other words, it is behaviour and situation specific. The TTM proposes that a person moves through several stages in order to change his behaviour including physical activity, and

self-efficacy is believed to be an important influence on people to move towards the upper stages of change.

Studies have shown that an individual's self-efficacy increases as that individual progresses from the lower stages for example, from pre-contemplation or contemplation to higher stages of exercise readiness like in the action or maintenance stage (Callaghan, Eves, Norman, Chang, & Cheung, 2002; Kim, Cardinal, & Lee, 2006b). One possible explanation to this is the relatively high expectation of successful performance. According to McAuley and Mihalko (2005) the greatest influence of self-efficacy on exercise behaviour is performance accomplishment. It is expected that individuals who believe they are capable of performing the required actions to meet the situation demands will be more likely to engage in the actions. Hence, it would be interesting to know whether the Malaysian teacher trainees (as future role models for our younger generation) would have the self-efficacy or the self-belief about their ability to take on regular physical activity.

Decisional Balance

Another variable that is said to influence exercise behavioural change is the decisional balance. The decisional balance is a person's relative weighing of the perceived benefits (Pros) and costs (Cons) of making a behavioural change (Kim, 2007) and it is regarded as an important decision-making process. Therefore, it is assumed that individuals will not change their behaviours unless they perceive the positives outweigh the negatives of change (Gorely & Bruce, 2000; Kim, 2007). According to the Transtheoretical Model, it is hypothesized that the perceived benefits of exercise will increase while the costs of exercise will decrease across the stages of change from pre-contemplation to maintenance (Gorely & Bruce, 2000; Gorely & Gordon, 1995; Marcus, Rakowski, & Rossi, 1992b; Prochaska & Marcus, 1994). So, it is also

important to know how the teacher trainees would evaluate the perceived benefits (Pros) and costs (Cons) of exercise towards maintaining a physically active lifestyle.

Processes of Change

The strategies or processes of change are also critical in influencing exercise behavioural change. These processes of change are overt and covert actions in the form of behaviours, cognitions and emotions used by individuals as they progress through the various stages of change during the course of establishing a behaviour (Gorely & Bruce, 2000; Kim, 2007). Individuals at the different stages of readiness are supposed to utilize different processes of change to change their behaviour (Marcus, Rossi, Selby, Niaura, & Abrams, 1992c; Plotnikoff, Hotz, Birkett, & Courneya, 2001) with cognitive processes being more frequently utilized in the early stages of change (e.g. contemplation stage) while behavioural processes are preferred in the later stages (e.g. action stage). Hence, it would be beneficial to find out what the strategies or actions being employed by the teacher trainees towards maintaining a physically active lifestyle.

Physical Self-Perception

Many research have also focused on the role of the self in exercise behaviour (Boyd, Weinmann, & Yin, 2002; Fox & Corbin, 1989; Lindwall & Hassmen, 2004; Welk, Corbin, Dowell, & Harris, 1997; Whitehead, 1995). Self is believed to be an important variable in the exercise domain (Kendzierski, 1990). How a person perceives oneself is important in attempts to change a lifestyle such as in exercising. It is believed that if an individual feels positively about oneself in a particular domain such as in physical activity, then he is more likely to pursue and achieve the desire outcomes in the domain than a person who does not feel positively about himself (Marsh et al., 2006). In

another example, Caglar and Asci (2006) found that participants in the high physical activity group scored significantly higher in all sub-domains of the Physical **S**elf-Perception Profile (PSPP) than participants from the low physical activity group**,** suggesting that physical self-perception has a positive relationship with exercise adherence. Hence, to understand exercise behaviour of the teacher trainees, it would be crucial to examine the physical self-perception of teacher trainees in relation to their exercise behaviour.

In addition to the psychological variables mentioned above, demographic variables may also influence exercise behaviour. Most theoretical models acknowledge the importance of individual differences as an influence on behaviour.

Gender

The findings of three surveys National Health Morbidity Survey II (1996), Malaysian Adults Nutrition Survey (2003) and National Health Morbidity Survey III (2006) conducted by the Ministry of Health at national level, also showed that female were more inactive than their counterparts. For example, in the National Health Morbidity Survey III (2006), 18.7% of the male participants indicated that they were active physically during leisure time compared to only 10.7% of the female (Institute for Public Health, 2008). These findings are consistent with the findings from other similar studies (Institute for Public Health, 1999; Ministry of Health Malaysia, 2007).

In addition, some studies (Burger & Dolny, 2002; Kylie, David, & Neville, 2000) have indicated that women in particular are anxious about their body image and specifically, they were more worried about their appearance and weight. These arguments however, are not comparable with findings that suggested women were physically less active particularly among the younger age group. Women would be more motivated to be active physically if they were more concerned about their

appearance and weight. In Biddle and Armstrong's study (2007), they found positive correlations between intrinsic motivation and physical education for boys but negative for girls suggesting that boys have more intrinsic motivation towards physical activity whereas the girls may depend on extrinsic incentives (Welk, 1999). In another research by Trost et al. (1996), it was found that boys were more active than girls due to greater confidence (self-efficacy) and accessibility (e.g. equipment, facilities). For this reason, this study would also examine the exercise behaviour among the young teacher trainees in relation to gender variable.

Age

As reported in both the Second National Health Morbidity Survey (NHMS II, 1996) and the Third National Health Morbidity Survey (NHMS III, 2006) the most physically active age group during leisure time were from participants between the ages 18 to 25 years old. However, the physical activity level has been found to decline with age. For example, the findings from NHMS III (2006) indicated that physical activity prevalence for the age group 18-19 years, 20-24 years, and 25-29 years have declined from 23.2% to 17.7% to 15.3% respectively and this trend continued to decline as the age groups get older (Institute for Public Health, 2008).

Wuest and Bucher (2003) indicated that the period between late adolescence and early adulthood is a "critical phase in life" from the perspective of health lifestyle promotion because it is during this period when lifestyle choices are explored and tested and adult habits begin to emerge. The subjects in this study are teacher trainees between 18 to 25 years of age, and hence fall within this "critical phase in life" in developing habitual adult behaviours including maintaining a physically active lifestyle. In view of the trend towards a gradual decline in the amount of physical activity seen from childhood to adulthood, in particular during adolescence and the apparent health

consequences of such a trend, it would be exciting to examine whether these teacher trainees would exhibit any differences in their physical activity levels with regard to their age in influencing their participation in physical activity.

Ethnicity

Another demographic variable of interest in this study is ethnicity. Findings in the National Health Morbidity Survey III (2006) revealed that there was a difference in the prevalence of physical activity in terms of ethnicity. Among the ethnic groups, non-Malay Bumiputera was most active physically with 16.9% reported to have exercised during leisure time followed by the Malay Bumiputera (15%) and the Indians (13.3%). The Chinese was found to be the most physically inactive ethnic group with only 12% reported exercising during leisure time.

Several studies have also shown that ethnicity or race may have an influence on the physical activity level (Callaghan et al., 2002; Juniper, Oman, Hamm, & Kerby, 2004; U.S. Department of Health and Human Services, 1996). For instance, Callaghan and his colleagues (2002) revealed that Chinese students were less active when compared with British and Canadian students. Elsewhere, Black Americans were found to be less active compared to White Americans (Juniper et al., 2004; U.S. Department of Health and Human Services, 1996).

As a nation with diversified ethnicity population, it is imperative that efforts are being made to investigate the characteristics of various ethnicities including their exercise behaviour. Accordingly, it is valuable to examine further to understand the influence of ethnicity in relation to physical activity level among the Malaysian teacher trainees.

From the perspective in the promotion of active healthy lifestyle, the teacher trainees as a whole is an important population group to target for the exercise behaviour

change. The teacher trainees were selected over servicing teachers in schools as the target population in this study because the former are supposed to be the future advocates of physically active lifestyle to our younger generations through the curriculum of physical education in schools. The training environments they currently undergo provide a physical environment that make physical activity convenient and enjoyable and hence help to promote physical activity among them. With this unique opportunity provided in the teacher education institutes, they can be moulded to become better role models to their students upon graduation. For that reason, the teacher trainees are deemed to be a more interesting group to study on.

1.3 Purpose of the Study

Based on the above rationalization, this study was conducted to examine the teacher trainees' own habitual physical activity engagement such as their stages of readiness in exercise, their decisional balance for exercise, self-efficacy for exercise, and physical self-perceptions towards a healthy lifestyle by way of participation in regular exercise and physical activity. The present study also aspired to investigate on the demographic variables particularly age, gender, and ethnicity in relation to the exercise behaviour of the Malaysian teacher trainees.

Specifically, this study seek to determine the proportion of the Malaysian teacher trainees in each of the five stages of exercise, the differences in their self-efficacy, their decisional balance and their processes of change across the stages of exercise behaviour, and to identify the correlation between these psychological variables and their exercise behaviour.

In view of the teacher trainees' relative strength and weakness in their physical self-perception, it might have some implications on educational practice particularly in terms of their effectiveness in conducting physical education and sport co-curriculum

activities in schools. This study further aimed to assess the perceived physical self-perception profile of the teacher trainees. The teacher trainees' physical self-perception profile was examined in relation to their demographic variables such as gender, age and ethnicity and its relationships with the other psychological variables mentioned above namely self-efficacy, decisional balance and processes of change for exercise.

1.4 Research Questions

In accordance with the purpose of this study, the following research questions are formulated to guide the proposed study**:**

1. What are the physical activity levels of the Malaysian teacher trainees in relation to the following demographic variables**:** gender, age and ethnicity?
2. What are the stages of exercise change of the Malaysian teacher trainees in relation to the following demographic variables**:** gender, age and ethnicity?
3. What are the differences in psychological variables in terms of (a) self-efficacy, (b) decisional balance (c) processes of change, and (d) physical self-perception profile among the Malaysian teacher trainees in relation to the following demographic variables**:** gender, age and ethnicity?
4. What are the relative strength of the psychological variables in terms of (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees?
5. Does the proposed model for exercise/physical activity fit the data collected?

1.5 Theoretical framework

The Transtheoretical Model has been identified as one of the most commonly applied behaviour-prediction models in the exercise domain. The Transtheoretical Model is an integrative model of intentional behaviour change, which exemplifies how people attain a positive behaviour or change a negative behaviour. This model was initially developed by Prochaska and his colleagues at the Cancer Prevention Research Center at University of Rhode Island (Reed, 1999) for the cessation of an unhealthy smoking behaviour. The Transtheoretical Model was later introduced to exercise behaviour with considerable success (Marcus et al., 1992a; Marcus, Eaton, Rossi, & Harlow, 1994; Marcus et al., 1992b; Marcus et al., 1992c; Marcus, Selby, Niaura, & Rossi, 1992d; Nigg & Courneya, 1998; Prapavessis et al., 2004). This model has been widely validated and many researchers in the field of exercise and physical activity have recommended the Transtheoretical Model be applied to assess exercise behaviour in view of its applicability and generalizability to measure exercise behaviour repeatedly (Marcus et al., 1992c; Marcus et al., 1992d). For example, the President's Council on Physical Fitness and Sports has issued a report stating that physical activity intervention using the stages of motivational readiness for change model (Transtheoretical Model) have shown to increase the physical activity level among sedentary adults and that both targeted and tailored intervention based on stages of change model are effective for the promotion of physical activity (Marcus & Lewis, 2003).

The Transtheoretical Model has four key constructs namely the stages of change, processes of change, self-efficacy, and decisional balance. It is known as an integrative model of behaviour change because it integrates constructs from other theories such as the self-efficacy construct from Bandura's social learning theory and the decisional balance construct from Janis and Mann's model of decision making, (Marcus et al., 1994; Prochaska & Marcus, 1994).

The first construct which is also the key concept in this model is the stages of change. This is the reason why sometimes the Transtheoretical Model is also referred as the stages of change model (Carron, Hausenblas, & Estabrooks, 2003). The stages of change reflect a temporal dimension that specifies the steps of progress made by the participants. In fact, the strength of the Transtheoretical Model in its application to the study of exercise behaviour is its focus on the dynamic nature of behaviour change where the Transtheoretical Model acknowledges that individuals differ in their readiness to adopt new behaviours (Jordan, Nigg, Norman, Rossi, & Benisovich, 2002; Marcus et al., 1992b; Marcus et al., 1992c; Plotnikoff et al., 2001; Prochaska & Marcus, 1994). The Transtheoretical Model proposes that an individual moves through a series of stages usually in a cyclical manner in his effort to change behaviour (Berry, Naylor, & Wharf-Higgins, 2005; Nahas et al., 2003; Nigg et al., 2005). These five stages (Callaghan et al., 2002; Marcus et al., 1994; Marcus et al., 1992b; Marcus & Simkin, 1993) are as follows:

a) Pre-contemplation Stage - individuals who are inactive and not even thinking about participating in exercise;
b) Contemplation Stage - individuals who are inactive but considering to become active;
c) Preparation Stage - individuals who have begun limited programmes of exercise but not at recommended levels;
d) Action Stage - individuals who are physically active at recommended level but have only been active for less than six months;
e) Maintenance Stage - individuals who are regularly exercising at the recommended level for more than six months.

Several related studies (Kosma, Ellis, Cardinal, Bauer, & McCubbin, 2007; Marcus et al., 1994) have also indicated that the stages of behaviour change have served as a mediating role in physical activity participation. Marcus et al. (1994) in their research have found that participants with high Pros, low Cons, and high self-efficacy scores are related to high physical activity only indirectly, that is through the mediation of the stages of change. Kosma and colleagues (2007) in their study to identify the mediating role of intention and the stages of change (SOC) in physical activity demonstrated quite clearly that SOC was a stronger predictor of future physical activity than intention and that attitude has the highest effect on SOC. The direct effect of attitude on physical activities was not significant and that the indirect effect of attitude approached a full mediation on physical activity through SOC.

The second construct of the Transtheoretical Model is the processes of change. These processes of change are strategies or activities engaged by individuals as they progress through the stages of change. This model maintained that individuals in different stages need to use different strategies or processes to facilitate movement to the next stage. Some groups of individuals are more susceptible to physical inactivity and in need of the strategies outlined in the Transtheoretical Model, which are experiential or cognitive processes and behavioural processes. The experiential processes of change are related to individuals' responsiveness to how exercise may help them, and their feelings about exercising. In contrast, behavioural processes of change are things or actions that individuals do to help them exercise such a**s** placing things around the house or office to remind them to exercise. It has been hypothesized that experiential processes have a much more significant impact than the behavioural processes for understanding and prediction of progress in the earlier stages of change. On the other hand, the behavioural processes seemed to be more important for

understanding and prediction of progress in the later stages of change (Prochaska & Marcus, 1994).

The third construct of this model is self-efficacy. Self-efficacy, a key concept in Bandura's Social-cognitive theory (Nahas et al., 2003) has been integrated into the Transtheoretical Model due to its strong association with stages of change (Marcus et al., 1992d; Sung, 2003). This theory hypothesizes that confidence in one's ability to perform a given behaviour is strongly related to the actual ability to perform that behaviour (Marcus et al., 1992d; Nahas et al., 2003) and self-efficacy specifically in the context of physical activity or exercise is the perception of individual efficacy or confidence regarding one's ability to be active on a regular basis. This theory further suggests that an individual's efficacy is situation-specific and may vary in relationship to personal circumstances like sickness ((Kim, 2007). Other similar research (Marcus et al., 1992d; Nigg & Courneya, 1998) have revealed the strong relationship between self-efficacy and the stage of change. In a study conducted by Marcus, Selby, Niaura, and Rossi (Marcus et al., 1992d), it was revealed that individuals at different stages of change, have different degrees of exercise-specific self-efficacy and this suggests that individuals at various stages might benefit from different intervention approach. For example, an individual may show very high self-efficacy (high confident level) to maintain a brisk walking programme in his usual environment but may show low confident level to adhere to his brisk walking programme while he is on vacation.

Another dimension or construct of the Transtheoretical Model is the decisional balance. The decisional balance is based on the theoretical model of decision making proposed by Janis and Mann (Marcus et al., 1992b). Behaviour change is assumed to involve a systematic assessment of the potential benefits (Pros) and costs (Cons) associated with the intended behaviour change (Kim, 2007; Marshall & Biddle, 2001; Nigg, 2001). It is assumed that an individual will not change his or her behaviour unless

he or she perceives the positives of change will outweigh the negatives of change (Kim, 2007).

This study will also examine the role of physical self-perceptions as motive that contribute to regular physical activity or exercise and keep individuals from relapsing to a sedentary lifestyle. A large number of research has also focused on the role of the self in exercise behaviour (Boyd et al., 2002; Fox & Corbin, 1989; Lindwall & Hassmen, 2004; Welk et al., 1997; Whitehead, 1995). It is evident that how a person perceives oneself is important in one's attempts to change a lifestyle such as in exercising. The rationale for this is that if an individual feels positively about oneself in a particular domain such as in physical activity, then he is more likely to pursue and achieve the desire outcomes in the domain than a person who does not feel positively about himself (Marsh et al., 2006).

According to Fox (1998), our body provides the medium through which we interface with life and therefore our perception of our physical selves provide the key to the understanding of our identities and our behaviour patterns. Therefore it is not surprising that a well-trained and good physique serves as an important investment in one's image to others in the modern society (Lindwall & Hassmen, 2004). The self-perceptions that individuals hold of themselves particularly of their body and their physical competence (physical self-perceptions) will provide them with the sense of effectiveness, self-determination, personal acceptance which have been linked to the enhancement of global self-esteem (Fox, 2000; Lindwall & Hassmen, 2004). Kowalski, Crocker & Kowalski (2001) affirmed that self-presentational concerns may be a major source of motivation for participating in physical activity especially for women. This is likely due to the socio-cultural pressures on women to maintain body slimness and physically fit body.

1.6 Conceptual Framework of the Study

Based on the above theoretical framework and literature review, an *a priori* model was developed (Figure 1.1) for this study. This model illustrated the proposed integrative model of exercise behaviour that incorporated the Transtheoretical Model and the Physical Self-Perception. The proposed model consists of the interrelationships of six variables (Self-Efficacy, Decisional Balance, Processes of Change, and Physical Self-Perception) and their causal effects on Physical Activity with the Stages of Exercise Change acting as a mediating factor.

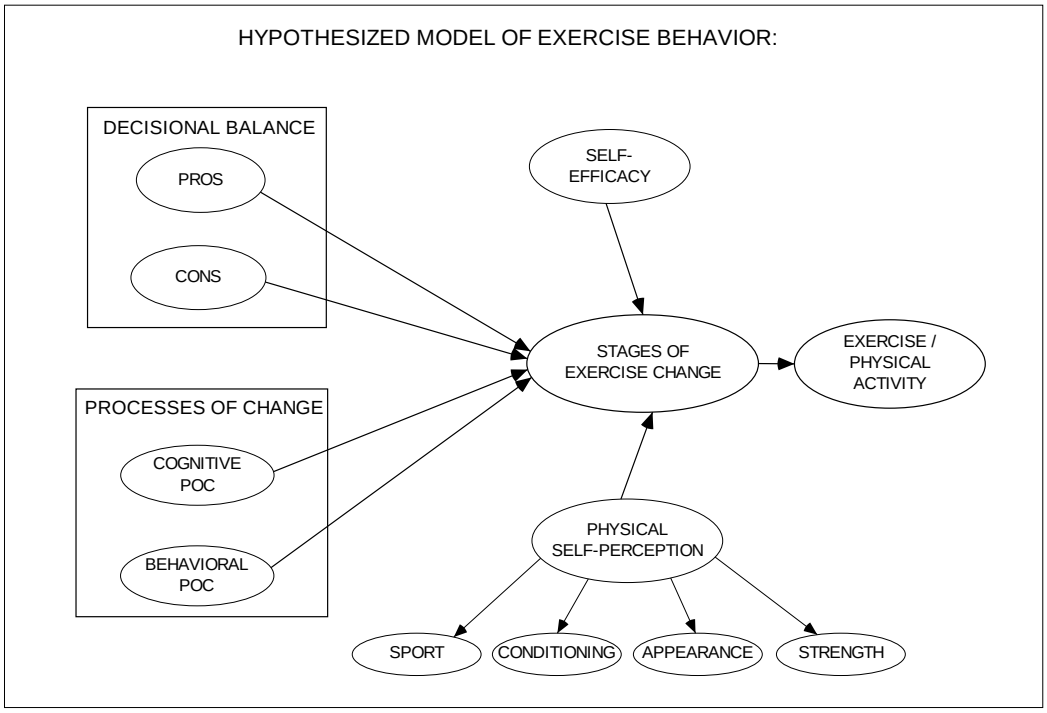


Figure 1.1: Conceptual Framework of the Study

a) Physical Activity and Stages of Exercise Change

Physical activity is defined as any body movement produced by skeletal muscles that results in the utilization energy (expressed in kilocalories) and such activities include occupational, leisure-time and routine daily activities (U.S. Department of Health and Human Services, 1996). On the other hand, exercise is physical activity that

is planned and structured that involves bodily movement carried out to improve or maintain one's physical fitness. These physical activities can require light, moderate or heavy in effort and can lead to enhanced fitness if they are practiced frequently. However, for physical activity to have an impact on health, individuals should participate in a minimum required quantity. The American College of Sport Medicine and Centres for Disease Control maintain that individuals should not have less than 30 minutes of moderate intensity physical activity on most, if not all days of the week (Carron et al., 2003).

Despite the physiological and psychological benefits of exercise such as better weight control, lowered risk of cardiovascular disease, reduced tension and depression, and improved self-esteem, society as a whole still do not exercise enough and this lack of physical activity is aggravated by certain individual differences. As individuals must continue to be physically active to sustain the full benefits of regular exercise, the issue of maintenance and initiation of physical activity is of importance to everyone.

The initiation of physical activity requires a person to change his or her current exercise behaviour (physical activity level). However, individuals will differ considerably in their readiness or willingness to change. The Transtheoretical Model argues that individuals need to progress through several stages to change their exercise behaviours (increase the level of physical activity) (Cardinal, 1997; Kim, 2007). The Transtheoretical Model proposed five stages of readiness; pre-contemplation, contemplation, preparation, action and maintenance (Lee, Nigg, DiClemente, & Courneya, 2001; Marcus et al., 1992a; Nigg & Courneya, 1998). In relation to the subject discussed, hence this study hypothesized that:

H1: The Stages of Exercise Change (SEC) has a positive and significant relationship with the physical activity (PA).

Various studies (Maddison & Prapavessis, 2006; Nigg & Courneya, 1998; Prapavessis et al., 2004) using the Transtheoretical Model (TTM) have revealed that self-efficacy, decisional balance and processes of change have strong influence on the stages of exercise behavioural change of young people. An earlier study by Marcus, et al. (1994) has indicated that the stages of readiness acting as a strong mediating role between the variables (self-efficacy and decisional balance) and exercise behaviour. However, Marcus and colleagues did not examine all the Transtheoretical Model at one time, focusing only on self-efficacy and decisional balance and leaving out the processes of change. In addition, empirical evidences to support the mediator role of stages of change between other constructs of the Transtheoretical Model were not extensively examined. In this study, it is hypothesized that the Stages of Exercise Change will serve as a mediating role between all the Transtheoretical Model constructs (Self-Efficacy, Decisional Balance and Processes of Change) together with the Physical Self-Perception Profile and physical activity participation (exercise behaviour).

b) Self-efficacy

Self-efficacy is one's perceived confidence in the ability to carry out a specific behaviour successfully (Kim, 2007; Marshall & Biddle, 2001; Nigg & Courneya, 1998). Self-efficacy is situation-specific and may differ according to individual circumstances (Kim, 2007) and are closely related to the performance of many behaviours such as in exercising (Marcus et al., 1992d). It is suggested that through the Transtheoretical Model theory, self-efficacy in exercise increases as a person moves higher up the stages of exercise change. Another significant **s**tudy has also shown that self-efficacy in exercise has been able to predict the exercise adoption and adherence in middle-age adults (Gorely & Bruce, 2000; Marcus et al., 1992d). Based on previous literature, it is

expected that self-efficacy in exercise will increase across the stages of exercise change. Hence, in this study, it is hypothesized that:

H2: Self-Efficacy (SE) has a positive and significant relationship with the stages of exercise change (SEC).

H3: Self-Efficacy (SE) has a positive and significant relationship with the physical activity (PA).

c) Decisional Balance

The decisional balance reflects the individual's relative weighing of the perceived positive or Benefits of Exercise (Pros) and the negative or the Costs of Exercise (Cons) of making a behaviour change (Kim, 2007) and is thought to be an important decision-making process and hence has a significant influence on one's behaviour change (Nigg & Courneya, 1998). It is expected that individuals will not change their behaviours unless they perceive the positives outweigh the negatives of change (Gorely & Bruce, 2000; Kim, 2007). Studies have documented that the Pros increase and Cons decrease across the stages of change from pre-contemplation to maintenance (Gorely & Bruce, 2000; Gorely & Gordon, 1995; Marcus et al., 1992b; Prochaska & Marcus, 1994). Based on the earlier findings ((Nigg & Courneya, 1998), the Pros will increase across the stages of change, that is, Pros are less applicable in the earlier stages (i.e. pre-contemplation) but get more relevant towards the later stages of change. On the other hand, Cons are expected to show the opposite profile. Consequently, it is hypothesized in this study that:

H4: The Benefits of Exercise (Pros) have a positive relationship with the stages of exercise change (SEC).

H5: The benefit of exercise (Pros) has a positive relationship with the physical activity (PA).

H6: The cost of exercise (Cons) has a negative relationship with the stages of exercise change (SEC).

H7: The cost of exercise (Cons) has a negative relationship with the physical activity (PA).

d) Processes of Change

The processes of change are overt and covert actions that individuals utilized to help to modify their thoughts, environment and experience in an attempt to change their behaviour (Gorely & Bruce, 2000; Kim, 2007). Individuals at the different stages of readiness are assumed to utilize distinct processes of change to change their behaviour (Marcus et al., 1992c; Plotnikoff et al., 2001) with cognitive processes being more frequently used in the early stages (e.g. contemplation) while behavioural processes are preferred in the later stages (e.g. action). In other words, the use of the five cognitive processes of change will decrease across the stages (i.e. use more during the early stages but lesser at the later stages), whereas the opposite is hypothesized for the behavioural processes, that is, the use of the five behavioural processes of change will increase across the stages (i.e. use less in earlier stages but more at the later stages).

However, in more recent years (Dishman, Jackson, & Bray, 2010a; Wadsworth & Hallam, 2007), studies have revealed that people do not differentiate the two types of processes of change in their endeavour to maintain their physical activity. They found that individuals used both the cognitive and behavioural processes in their attempts to maintain their physical activity. Thus, in this study, it is hypothesized that:

H8: The Processes of change (POC) has a positive and significant relationship with the stages of exercise change (SEC).

H9: The Processes of change (POC) has a positive and significant relationship with the physical activity (PA).

e) Physical Self-Perception

The feelings of self-competence in athletic activities has been alleged to motivate adolescents to achieve higher levels of exercise and that physical appearance has been shown to be an important consideration for adolescents when engaging in exercise behaviour (Nigg & Courneya, 1998). In addition, the body and aspects of appearance have been found to be the strongest predictors of global self-esteem (Lindwall & Hassmen, 2004). It is not surprising that some people are motivated to exercise for self-representation reasons in view of the fact that people are influenced by the concern of look good and be popular. People who exercise regularly feel more confident about the way they look.

Marsh, Papaioannou, and Theodorakis (1994) found that more positive levels of prior self-concept led to higher subsequent levels of exercise behaviour and higher levels of prior exercise behaviour led to higher levels of subsequent physical self-concept. The reciprocal effects model in Marsh et al. study implied that physical self-concept and exercise behaviour are reciprocally related and mutually reinforcing. Therefore, this study hypothesized that:

H10: The Physical Self Perception has a positive and significant relationship with the stages of exercise change (SEC).

H11: The Physical Self Perception has a positive and significant relationship with the physical activity (PA).

Hence, the proposed integrative model of exercise behaviour that incorporated the full Transtheoretical Model (with all the TTM constructs namely: Self-efficacy,

Decisional Balance, and Processes of Change), and together with the Physical Self-Perception Profile hope to illustrate the interrelationships and their causal effects on Exercise Behaviour (Physical Activity) with the Stages of Exercise Change acting as a mediating factor.

1.7 Definition of Terms

To ensure terms used in this study are interpreted consistently, the following terms are operationally defined as follows:

Stages of Change – In this study, stages of change are defined as the temporal dimension in which attempts to change behaviour occurs. This term has the same meaning with stages of exercise behaviour change and in this study, it will be used interchangeably. In exercise, it is hypothesized that individuals progress through a series of stages (Callaghan et al., 2002; Marcus et al., 1992d). In this present study, the Stages of Change Questionnaires by Marcus, Selby, Niaura, and Rossi (1992d) and adapted by Courneya (1995) will be employed to establish the stages of exercise change of the participants of the current study and the five stages of change are:-

a) Pre-contemplation – not even thinking about participating in exercise;
b) Contemplation – seriously considering starting to exercise;
c) Preparation – beginning a limited programme of exercise;
d) Action – regularly exercising at the recommended level for six months or less;
e) Maintenance - regularly exercising at the recommended level for more than six months

In this study, participants choose the statement that best describes his or her current level of exercise based on the five statements that describe the five stages of exercise change (see above). For example, a participant who has chosen the statement "*I currently do not exercise, but I am thinking about starting to exercise in the next 6*

months" which reflects the contemplation stage will be placed in the contemplation stage.

Self-efficacy – for the purposes of this study, self-efficacy will refer to the confidence of an individual has in his or her ability to perform a behaviour (Callaghan et al., 2002). Self-efficacy in exercise is deemed to be situation-specific and may differ according to individual circumstances (Kim, 2007) and is closely related to the movement between the different stages of readiness as in exercising (Marcus et al., 1992d). It is suggested that self-efficacy in exercise increases as an individual progress through the different stages of behaviour change. Self-efficacy in this study will be measured using the Self-Efficacy scale Questionnaires (SEQ) adapted by Nigg and Courneya (1998) from the original scale by Marcus, Selby, Niaura and Rossi ((1992c). An example of an item in this questionnaire will be *"I am confident I can participate in regular exercise when I am tired*".

Exercise – This research will define exercise as a specific form of physical activity in which the individual engages for the specific purpose of improving fitness, physical performance, or health (Carron et al., 2003).

Physical activity – Physical activity in this study refers to any body movement produced by skeletal muscles and resulting in a substantial increase over the resting energy expenditure. Implicitly physical activity includes exercise, sport, work, leisure time activity (Carron et al., 2003). In this research, the term physical activity is operationally referred to activities that are carried out during leisure time for improving fitness, physical performance, or health and hence is to be used interchangeably with the term exercise. In this study also, the physical activity is measured through the Leisure-Time Physical Questionnaire and converted into a standard metabolic

equivalent (MET), by multiplying the estimated rate of energy expenditure of participation in each level of physical activity reported in the questionnaire.

Metabolic Equivalent (MET) – A unit used to estimate the metabolic cost (oxygen consumption) of physical activity. One MET is equal to the sitting metabolic rate of approximately 3.5 ml of oxygen per minute (Bouchard, Blair, & Haskell, 2007).

Regular Physical activity – This study will define regular physical activity as a level of physical activity that represents engaging in moderate exercise involving large muscle groups, three or more times a week for at least 20 minutes each session (U.S. Department of Health and Human Services, 1996).

Decisional balance – In this research, decisional balance means the measures of the balance between positive (Pros) and the negative (Cons) belief about the consequences of exercise (Callaghan et al., 2002). It is hypothesized that individuals will not change their behaviour if they do not perceive the positives outweigh the negatives of changing the exercise behaviour. In this present study, decisional balance will be assessed with the Decisional Balance Questionnaires (DBQ) developed by Marcus, Rakowski and Rossi (1992b). An example of a pro item is "*Regular exercise would help me relieve tension."* and an example of a Cons item is *"I would have less time for my family and friends if I exercised regularly."*

Processes of change – For the objectives of this study, processes of change is defined as any activity that is initiated or experienced by an individual to modify one's thinking, feeling or behaviour. There are ten processes of change and they can be categorized into two broad classes namely:-

a) The experiential or cognitive processes comprised of individuals awareness of how exercise may help them and their feelings about exercise which include

gathering information, making substitutions, being moved emotionally, being a role model, developing a healthy self-image and taking advantage of social mores whereas

b) The behavioural or environmental processes are things that individuals do to help them exercise which include making substitutions, getting social support, making commitments, being rewarded, and using cues. (Carron et al., 2003).

In this study, the 10 processes of change will be measured with the Processes of Change Questionnaires (PCQ) developed by Marcus, Rossi, Selby, Niaura and Abrams (1992c) and each process of change will be separately scored. The mean scores for each of the processes of change will be calculated by summing up the participants' responses to each processes of change separately and dividing by the number of items respectively.

Teacher Trainees – In this study, it refers to teacher trainees/pre-service teachers who are enrolled in the teacher preparation programmes known as the *Program Ijazah Sarjana Muda Perguruan (PISMP).* This programme is a five and a half year full-time teacher training course consisting of a three-semester foundation course and another eight semesters of classroom-based courses and school-based practical training. In this study, the term *teacher trainees, pre-service teachers,* and *student teachers* will be used interchangeably.

1.8 Significance of the Study

In Malaysia, physical education is a compulsory subject in the primary and secondary school curriculum (Khoo, 2005; Wee, 2001). The Malaysian physical education curriculum is aimed at encouraging positive attitude towards physical activity to promote lifetime involvement by focusing on fitness, skills and sports (Khoo, 2005).

Nevertheless, the teaching of physical education subject in the Malaysian schools has yet reached a satisfactory level desired (de Vries, 2008 ; Wee, 2008). This is probably due to the fact that most physical education classes are being taught by non-specialist teachers or class teachers particularly in primary schools throughout Malaysia.

However, with the shortage of qualified physical education teachers, it is inevitable that the implementation of physical education programmes in Malaysian schools is still heavily dependent on the non-physical education major teachers. On the other hand, past researches have also revealed that physically active (positive role model) teachers are especially critical for successful instructions in physical education (LaMaster et al. 1998; Mackenzie et. al, 1999; Melville & Maddalozzo, 1988).

Apparently, there is a necessity to understand the exercise behaviour of the Malaysian teacher trainees or pre-service teachers in order to know their potential to teach physical education effectively. In addition, this study would also help to trigger awareness among the teacher trainees of their current physical activity levels and encourage them to adopt a more physically active lifestyle and thereby improving their role modelling potential and consequently producing more effective physical education teachers.

Recently the Ministry of Education (MOE) had launched a campaign known as "one student one sport" for every primary and secondary student. Through this campaign, the Ministry of Education hope that it will inculcate awareness in students, parents and teachers on the importance of being active physically for a healthier lifestyle. This campaign would also suggest that more teachers are required to ensure the smooth implementation of the programmes. So, the "one student one sport" campaign provides further justification for the needs to understand the teacher trainees' exercise behaviours. The apt timing of this study would also be able to provide crucial

information to the MOE relating to human resources required to implement the "one student one sport" campaign effectively and successfully.

The findings of this study on the exercise behaviour of teacher trainees would shed some lights on the characteristics associated with the different stages of exercise behaviour change among teacher trainees in Malaysia and therefore this would help to identify the physically fitter teacher trainees who can provide positive role modelling in physical fitness to their students during physical education classes in schools.

Furthermore, the findings of this study could also enlighten the MOE generally and specifically the Teacher Education Division (TED) as to what need to be reviewed in the teacher training curriculum so that it would be current and in accordance with the needs and demands of education in the local context. As a result, the TED could further develop new curriculum to overcome any shortcomings identified in the existing curriculum. Subsequently, new co-curriculum programmes could also be developed to ensure a more balanced development between curriculum and co-curriculum activities especially in the perspective of promoting physical activity in the teacher education institutes. In addition, this study may help the teacher trainees to adopt a more physically active lifestyle through better awareness and greater insight into physical behaviour concepts, thereby improving their role modelling potential.

More importantly, the findings of this study would be able to convey to the teacher trainees their actual status of exercise behaviour and the possible impact on their lifestyles. This study would also be able to identify or predict among the samples of teacher trainees who are at risk of a sedentary lifestyle and hence immediate actions could be taken by the different teacher education institutes to formulate effective intervention programmes so as to increase physical activity among them and create awareness of the importance of continuity of life-time involvement in physical activity.

Since most of the past studies in exercise behaviour and physical self-perception have been conducted in the context of the Western countries, for this research it is advantages to examine the exercise behaviour and the physical self-perception from the perspective of Malaysia. Besides, studies using the Transtheoretical Model to predict exercise behaviour are specifically limited in Malaysia, and usually involving only adolescents samples (Kee, Ong, & Wee, 2010; Omar-Fauzee & Hamdan, 2004). Hence this study would be able to expand the knowledge in the understanding of exercise behaviours and help to improve and promote physically active lifestyles among Malaysians.

1.9 Limitations

The limitations of this study include:

a) The study focused only on teacher trainees who were pursuing teacher training programmes in the teacher education institutes within West Malaysia. Although the generalizability of this study to the whole population is possible since the samples are chosen from randomly selected institutes, it may not be generalized beyond teacher trainees who are pursuing in teaching education institutes outside West Malaysia;

b) The accuracy of information will depend on the truthfulness and completeness of the participants in answering the self-report questionnaires of this study;

c) Although participants were briefed and instructed to work independently, they might not have responded to the questionnaires independently as desired.

1.10 Delimitations

In ensuring the manageability of the data collected for this study, the following delimitations were defined**:**

a) Due to geographical constraints and large number of potential participants in the study population, the study focused only on teacher trainees who were pursuing teacher training programmes in the teacher education institutes within West Malaysia;

b) This study also focused only on teacher education institutes that are fully under the administration of the Teacher Education Division, Ministry of Education. Trainees undergoing teaching training programmes conducted by the universities and private institutions were excluded in this study.

1.11 Conclusion

In conclusion, the framework provided by this study would be able to propagate the positive impact of regular exercise on health as well as on the quality of life across the life span of any individuals. The inclusion of regular physical activity into one's lifestyle is presently one of the most important behavioural changes advocated by health professionals (U.S. Department of Health and Human Services, 1996). Teachers who are themselves active in physical activity would be able to serve as good role model**s** and to positively influence their students in the schools to adopt healthy behaviours as well as raising the awareness of the importance of physical fitness. Consequently, educators must demonstrate healthy behaviours right from the first day they are being trained as teachers to ensure good health among themselves and to encourage active participation in physical activities among their students. Obviously, there is a need to understand better the exercise behaviour of the teacher trainee**s** in order to promote healthy lifestyles and physical fitness among them and in due course moulding them to be better role models for their students, our future generations.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The purpose of the present study was to investigate the attributes associated with the various stages of exercise behaviour change of the teacher trainees in Malaysia. Specifically, this study aspired to ascertain the proportion of the Malaysian teacher trainees in each of the five stages of exercise, the variations in their processes of change, self-efficacy, decisional balance for exercise and their physical self-perception profile across the stages of exercise behaviour and the relationships among the various variables as mentioned.

This chapter examined the literature related to physical activity and some of the theories and models that have been applied to the study of physical activity behaviour. The applications of the Transtheoretical Model specifically in exercise as proposed in this study were reviewed in detail. To enable easy comprehension of the literature, this chapter discussed the related literature review under several headings.

2.1 Physical Activity

Physical activity has been defined as any body movement produced by skeletal muscles and resulting in a substantial increase over the resting energy expenditure (Bouchard & Shephard, 1991 cited in Carron et al., 2003). Tacitly, this definition of physical activity include movement due to work, activities at homes, self-care, transportation and discretionary leisure time, which encompasses exercise and sports (Carron et al., 2003). Such activities can be light, moderate or heavy in effort and can lead to enhanced fitness if they are practiced frequently (U.S. Department of Health and

Human Services, 1996). However, for physical activity to have an impact on health, individuals should participate in a minimum required quantity of physical activity necessary to gain health benefits. Consequently, how much of physical activity is considered sufficient to achieve the health-related benefits? The new guidelines proposed by American College of Sport Medicine and Centers for Disease Control maintain that individuals should have not less than 30 minutes of moderate intensity physical activity on most, if not all days of the week (Carron et al., 2003).

There is a considerable amount of evidence telling the importance of physical activity in promoting health and quality of life. Scientific evidence show that regular physical activity and sporting activities provide individuals of all ages, gender and conditions such as individual with disability, with a wide range of physical, social and mental health benefits (WHO, 2003).

2.2 Benefits of Regular Physical Activity

Regular exercise or habitual physical activity has been consistently reported to provide significant benefits to both physically and psychologically (Myers & Roth, 1997). The physical health benefits derive from regular exercise range from cardiovascular health, body composition and weight management, musculoskeletal fitness and bone health. From the psychological perspective, regular exercise provides individuals with avenue for stress management, mood alteration, improve self-efficacy and enhanced self-concept.

2.2.1 Physical Benefits of Physical Activity

One of the significant benefits of physical activity is probably in cardiovascular diseases prevention. Through regular exercise the heart get stronger and therefore can pump more blood with each beat making it more efficient. Regular physical activity is

said to be able to reduce the risk of getting a heart attack. Individuals who engage in regular physical activity and sports have less risk of a heart attack possibly because active individuals have less atherosclerosis; have greater diameter of arteries and less chance for clotting as compared to those who are sedentary. Individuals who are physically active are more likely to develop better network of blood vessels particularly in the heart region. Studies have revealed that physical activity can promote the growth of *extra* bloods vessels referred to as *coronary collateral circulation* which can provide protection during a heart attack (Corbin et al., 2004).

Regular exercise is also associated with lowering of blood pressure (Corbin et al., 2004; Nieman, 1999). Unfit and less active people have a 30% to 50% higher risk of developing hypertension (Haskell et al., 1992). Research have also shown that individuals with mild hypertension can reduce their blood pressure between 8-10 mm Hg for systolic and between 6-10 mm Hg for diastolic readings in response to regular aerobic exercise (Nieman, 1999).

Another important contribution of regular physical activity is in weight control. Most people are concerned with their health and their physical appearance. Overweight has always been a health concern. Globally obesity is said to be on the rise. According to Corbin et al. (2004) more than 60% of Americans are overweight with 20% to 25% of them fall under the obese category. In Malaysia, the Malaysia Adult Nutritional Survey, MANS (2003) reported that 12.15% of Malaysian adults were obese with another 26.71% being classified under the overweight category (Ministry of Health Malaysia, 2007). Through regular physical activity, individuals can burn off their excess fat accumulated due to inactivity, besides keeping their body metabolic rate high and preventing the decline of basal metabolic rate due to reduced muscle mass as one aged (Corbin et al., 2004). Weight control is essentially a long term process that requires regular physical activity and hence for effective weight management, engaging in

regular physical activity such as exercising must be a regular part of one's lifestyle. A study on recreational physical activity and weight change by Williamson et al. (1993, cited in Sung, 2003) showed that men and women with low recreational physical activity were much more inclined to put on weight compared to those who were active and therefore suggesting that weight problems are more often than not due to lack of physical activity. Most types of physical activity can be beneficial for weight management. However, aerobic exercise is the best type of physical activity for fat loss since it can be maintained for a long duration of time (Corbin et al., 2004).

Regular physical activity is also essential for the development and maintenance of musculoskeletal fitness comprising muscular strength, muscular endurance and flexibility (Nieman, 1999). Muscular fitness is important to increase work capacity, to delay fatigue, to prevent risk of injury and to reduce the chance of back pain (Nieman, 1999). According to ACSM, flexibility is required for the optimum functioning of all joints and the prevention of lower back pain. Exercises that strengthen the back and abdominal muscles can reduce the occurrence of lower back pain. Muscle mass and strength reduced on an average of 30% between the ages of 30 to 70 and this is mainly due to the aging process. However, studies have shown that the strength loss can be regained through resistance training (Nieman, 1999).

The development of muscular strength and endurance has also been associated with bone health. Exercise has been linked to the prevention of osteoporosis which is an age-related problem due to decreased bone mass and thus a risk factor for fracture in older adults. As stated by Vuori (1995), bone mass can be gained when exercise is started early in life and maintenance through adulthood with appropriate loads and intensity. Weight-bearing physical activities such as walking, running and playing various sports provide the necessary stress required for the bones to grow bigger and

become denser in response to the new imposed stress that exceeded the normal level (Nieman, 1999).

2.2.2 Benefits of Physical Activity for Children

Children and adolescents also benefit from involvement in physical activity. Performing physical activity regularly can assist young adults to develop and preserve healthy bones, muscles and joints. Regular practice of physical activity also help in the management of body weight through burning of body fat and assists in the development of stronger heart and lung (U.S. Department of Health and Human Services, 1996). Besides that, performing physical activity regularly also facilitates in the development of movement skills and the prevention and/or control of feelings of anxiety and depressions (U.S. Department of Health and Human Services, 1996; WHO, 2003).

Moreover, physical activity through play and sports provide youngsters the opening for natural self-expression, improved self-confidence, and sense of accomplishment, as well as understanding the spirit of solidarity and fair play besides social interaction and integration (WHO, 2003). It is also reported that adolescents who participated more frequent in physical activity are less likely to use tobacco, alcohol and abuse drug (WHO, 2003). Children and adolescents who are more physically active have also demonstrated to have higher academic performance as well (Beth Sigman, 2007; Grierson, 2005). On top of that, physical activity through team games and plays/sports are said to promote positive social integration and facilitate the development of social skills in young children (WHO, 2003).

2.2.3 Psychological Benefits of Physical Activity

One of the most important aspects of exercise benefits is its contribution towards the improvement of the quality of life. Physical activity is found to help in improving

psychological relieve. One prevalent assumption is that physical activity can help to relieve pain that are related to problems such as osteoarthritis, low back problems, rheumatoid arthritis, menstruation and childbirth (Carron et al., 2003). Physical activity not only can help in the management of physical stress but it also help to relieve emotional stress (Bunting, 1982). Physical activity such as aerobic exercise has been linked to the reduction of anxiety (Petruzzello et al., 1991) while running has shown to improve one's positive mood (Morris & Salmon, 1994). Besides that, physical activity provides a channel to release frustration and anger and assist in enhancing one's self-esteem (Corbin & Lindsey, 1994) while running has been associated with one's self-confidence and feeling of control (Sachs, 1982). Physical activity has also been linked to enhanced sleep although it was not necessary the quality of sleep (Carron et al., 2003).

In spite of the recognized health benefits of regular exercise, physical inactivity continued to be widespread. The U.S. Department of Health and Human Services (1996) estimated approximately 25% of the U.S. adult population was sedentary, 53% exercised irregularly, and only 22% engaged in sustained physical activity regularly indicating that less than one in four Americans exercise on a regular basis to achieve health benefits which is three or more times a week for at least 20 minutes per session. In Malaysia, the overall prevalence of physical inactivity among adults was at 43.7% and it has been reported that among those who do begin a physical activity programme, 50 % will eventually drop out within the first three to six months (Carmody et al., 1980; Dishman, 1988; Prapavessis et al., 2004).

For most people, engaging in moderate physical activity (recommended at 30 minutes) on most of the days per week require a change of behaviour. For physical activity promotion to be successful, people must have the willingness or readiness and the ability to change (Patterson et al., 2006).

2.3 Determinants of Physical Activities

Various determinants or factors could influence the behaviour of an individual as to how active he or she is towards physical activity. Nahas, Goldfine and Collins (2003) have broadly classified these determinants of physical activity into two types namely facilitators (determinants that encourage physical activity) and barriers (determinants that discourage participation in physical activity). Examples of facilitator determinant would be the accessibility to a fitness center or a park to jog. Examples of perceived barriers for physical activity include factors like the distance to facilities, lack of time or lack of confidence to perform a certain activity. Nahas et al. (2003) further categorized these variables or determinants of physical activity into four groups.

The first group, personal characteristics includes variable such as age, gender education, working experiences and health status. The second determinant group is the psychological or behavioural determinant such as self-efficacy, self-motivation, perceived barriers. The third group of determinant of physical activity includes factors like social support from people that are close to an individual such as friends and relatives, safety, weather and accessibility to facilities. The fourth determinant group relates to the nature of physical activity itself whether it is vigorous or not, aerobic or otherwise. Some of these determinants especially the psychological and environmental factors are adaptable while others are biologically established and hence are difficult to change. These psychological and environmental determinants that are most relevant to school and college physical education will be the focal of this study and will be discussed in more detail.

In order to understand how physical activity behaviour can be influenced and exercise process actually works; there is a need to review some of the theories and models associated with the initiating and maintaining exercise behaviour.

2.4 Theories and Models of Physical Activity Behaviour

As noted by Godin (1994), most of the earlier studies of adherence to physical activity during the 1970's lack of reference to theoretical models of human behaviour and this has led to the poor understanding of exercise adherence. In recent years, there has been a progress towards theoretically based studies (Kim, 2007) on exercise adherence and physical activity centering on the relationships between various psychological variables. Theoretical models are being developed to provide possible explanation to exercise adherence and how an individual's physical activity habits are being influenced. As such, in order to enhance better understanding of exercise behaviour, a review of several behavioural theories will be discussed below.

2.4.1 Health Belief Model

One of the earliest models used in attempting to provide explanation to exercise adherence and how physical activity habits of individuals are being influenced is the Health Belief Model. This model states that the adoption of health-related behaviour is dependent on how severe an individual perceived a potential illness and one's vulnerability to that illness. Such perception is also dependent on the perceived advantages and difficulties relating to the precautionary actions (Nahas et al., 2003). However, this model has not been very successful as a means of explaining habitual exercise behaviour. For example, contrary to what would be hypothesized by the health belief model, Lindsay-Reid and Osborn (1980) in their study found that firefighters who have lower perception of susceptibility to heart disease were more likely to take up regular exercise as compared to those who felt a higher susceptibility. Another similar study by Morgan, Shephard, Finucane, Schimmelfing and Jazmaji (1984) also found that individuals who perceived themselves as initially healthy were more likely to

maintain regular participation in exercise programme compared to those who did not perceive themselves as that healthy.

According to Dishman (1994), the likely explanation lies in the diversity of motives for exercising. As noted by Dishman, people have a great variation in motives for exercising and keeping healthy may just be one of the motives. Furthermore, this model according to Dishman, Washburn and Heath (2004) was designed for risk avoidance and not health promotion behaviour and therefore may not be that successful if applied to people who view engaging in physical activity or exercising as a health promotion activity than those who perceived physical activity as an illness-reducing behaviour. Another explanation according to Rejeski (1992, cited in Barrett, 1997) for the limited success of health belief model in predicting physical activity behaviour may be due to the delay in the consequences related to health outcomes and hence most people are not motivated by it.

2.4.2 The Protection Motivation Theory

Another model that has been employed to understand exercise behaviour is the Protection Motivation Theory. As described by Carron et al. (2003) this theory is concerned with the decision to protect oneself from harmful or stressful life events. According to this theory, decision to engage in health-related behaviour such as physical activity is thought to be influenced by two cognitive processes a) *threat appraisal* (the assessment of factors that influence the probability of engaging in an unhealthy behaviour such as sedentary lifestyle and b) *coping appraisal* (the assessment of factors that influence the likelihood of engaging in a preventive response such as engaging in physical activity).

Carron et al. (2003) described further that these two processes, each in turn depends on two factors. The threat appraisal is dependent on a) *perceived vulnerability*

which is an individual estimation of the degree of personal danger from a particular health danger if the unhealthy behaviour is maintained and b) *perceived severity* which is an individual estimation of the threat of the unhealthy behaviour. It is hypothesized that as perception of vulnerability and severity increases, the probability of engaging in the unhealthy behaviour (e.g. sedentary lifestyle) will decrease.

On the other hand, the coping appraisal is dependent on a) *response efficacy* which is a person's expectancy that the threat will be removed when in compliance with the recommendation action and b) *self-efficacy*, which is a person's confidence in the ability to apply the suggested coping behaviour. It is believed that as the response efficacy and self-efficacy of an individual increases, the likelihood of an individual to perform the preventive behaviour will also increase. Wurtele & Maddux (1987 cited in Dishman, 1994) who applied the Protection Motivation Theory to exercise behaviour found that although perceived susceptibility to cardiovascular problems and perceived self-efficacy enhanced intentions to exercise among a group of female undergraduates but the perceived severity of the disease failed to have an impact on the intention to exercise. In general, although threat seemed to be effective in enhancing participants' intention to change their behaviour, they are however, less effective in inducing and sustaining changes in behaviour and hence Protection Motivation Theory has limited usefulness for the study of exercise behaviour (Godin, 1994).

2.4.3 The Theory of Reasoned Action

The theory of Reasoned Action was developed by Fishbein and Ajzen and it is based on the assumption that people behave in the manner that is sensible and rational by considering available information and the potential implications of their behaviour before deciding to engage in them and hence is known as theory of "reasoned action" (Carron et al., 2003; Willis & Campbell, 1992). This theory composed of three main

constructs that influence behaviour; intention, attitude and subjective norm. A person's intention to act upon a behaviour is the main determinant of the behaviour which is manifested or shown in how hard one is willing to try in performing the behaviour (Carron et al., 2003). It is understood that the greater an individual's intention to put into practice certain behaviour, the greater is the likelihood that this person will get engage in that specific behaviour. *Attitude* within the context of the theory of reasoned action is one's optimistic or pessimistic assessment of the behaviour. In shaping behaviour, the person evaluates the consequences of both the positive and negative expectations of the behaviour. In term of *Subjective norm,* it reflects perceived social pressure that individual feel to perform or not to perform the behaviour and is believed to be determined by the perceived expectations of important significant others. Hence within the theory of reasoned action, it is assumed that people will plan to carry out the behaviour once they assess the behaviour to be favourable and think that people who are important to them (significant others) think they should also act upon it.

However this theory has its limitations in the way that its application in understanding exercise behaviour is useful only to volitional behaviour (behaviour a person can performs freely if desires). If behaviour is not under volition control (cannot be freely performed), even a person who is highly inspired by his or her own attitudes and subjective norm may not perform the behaviour (Carron et al., 2003). Consequently, an extended version of the theory of Reasoned Action known as the theory of Planned Behaviour was introduced.

2.4.4 The Theory of Planned Behaviour

The theory of Planned Behaviour is actually the extension of the theory of reasoned action by including the concept of perceived behavioural control to explain conditions where behaviour is not under the full control of the individual (Godin, 1994).

Perceived behavioural control represents the perceived easiness or difficulty of completing a behaviour (Carron et al., 2003). This theory assumes that perceived behavioural control influences behaviour either directly or indirectly through intention and that individuals are unlikely to have a strong objective to perform certain behaviour if they feel they lack the resources or opportunities to do so.

However, although perceived behaviour control construct has been found to help in predicting intentions to exercise, it did not always predict the actual exercise behaviour. As suggested by Berger et al. (2002) one possible reason for the lack of influence of this construct on exercise behaviour is that exercising itself is a volitional behaviour.

2.4.5 Self-Efficacy in Social-Cognitive Theory

Another widely used theory to explain physical activity behaviour is Bandura's (1986) triadic reciprocal causation within his Social-Cognitive Theory (Carron et al., 2003) which claims that individual factors, environmental influences, and the characteristics of the behaviour itself shape the behaviour change and these factors are all interrelated (Nahas et al., 2003). The main concept in Bandura's theory is the self-efficacy of an individual. It is the confidence of a person to successfully perform the desired behaviour. This theory indicates that to change certain behaviour, a person must feel competent for him to perform the desired behaviour such as in exercising or doing physical activity. According to Willis and Campbell (1992), the perceived self-efficacy is believed to affect both the initiation and maintaining of behaviour and the perceived self-efficacy judgment influence a person's choice of activities and environmental situations. They also suggested that self-efficacy also determines the amount of labour people will use and how long they will continue despite difficulty or aversive experiences. People will tend to engage themselves in activities and behave

with confidence even if they are in difficult situations if they perceive the activities to be within their ability, and will avoid situations that they perceive as beyond their capability.

Nahas, Goldfine and Collins (2003) state that self-efficacy in the context of physical activity, represent the perceptions of individual self-belief about one's ability to adopt regular physical activity whereas Sallis and Owen (1999) defined self-efficacy in physical activity as "a person's confidence in his or her ability to do specific physical activities in specific circumstances" (p.117). Hence according Nahas, Goldfine and Collins (2003) an individual may differ in the levels of self-efficacy for the various activities or circumstances in which the activity is to be executed.

Self-efficacy is often confused with a closely related construct, which is the outcome expectation (Carron et al., 2003). Self-efficacy is a judgment of a person's ability to perform a task whereas an outcome expectation is a judgment of what the performance of the task will produce. The distinction between efficacy expectations and outcome expectation is important in relation to health promoting behaviour because individuals who lack self-efficacy will most likely perform unsuccessfully even though they know what to do and how to do it (Willis & Campbell, 1992).

Studies have revealed that self-efficacy plays an important role in exercise and physical activity. Self-efficacy is certainly related with the intention to exercise as well as in the initiation of physical activity programme (Armstrong, Sallis, Hovell, & Hofstetter, 1993) and in the continuation of exercising (Marcus et al., 1992d).

2.4.6 Transtheoretical Model

A more recent and promising theoretical approach to understanding of exercise behaviour is through the Transtheoretical Model of behaviour change (Cardinal, 1995a; Jordan et al., 2002; Marcus et al., 1994; Marcus et al., 1992c; Marcus et al., 1992d). The

Transtheoretical Model is a model of intentional behaviour change, which exemplifies how individuals attain a positive behaviour or change a negative behaviour. This model has two key constructs. The first construct is the stages of change, which reflects a temporal dimension that specifies the steps of progress made by the participants. The second construct known as the processes of change are strategies that are used by individuals as they move through the various stages of change. Individuals in different stages may differ in their motivation and may need to use different strategies or processes to facilitate movement to the next stage. Certain groups of people are more at risk for physical inactivity and in need of the strategies outlined in the Transtheoretical model. Constructs originated from other theories, such as Bandura's self-efficacy and decisional balance from Janis and Mann's decision-making model, were later integrated within the Transtheoretical Model approach (Prochaska & Marcus, 1994). The following narration will discuss the core constructs of the Transtheoretical Model.

The Transtheoretical Model was initially developed by Prochaska and colleagues at the Cancer Prevention Research Center at University of Rhode Island (Bull, 2001) for the cessation of an unhealthy behaviour (smoking). The Transtheoretical Model was later utilized for the studying of exercise behaviour with considerable success (Marcus et al., 1992a; Marcus et al., 1994; Marcus et al., 1992c). The general descriptions of the constructs are as follow:-

a) Stages of Change

The first construct which is also the key concept in the Transtheoretical Model is the stages of change. That is why sometimes the Transtheoretical Model is also referred as the stages of change model. The stages of change reflect a temporal dimension that specifies the steps of progress made by the participants. In fact, the strength of the Transtheoretical Model is its relevance to the study of exercise behaviour is its

dynamism, (Berry et al., 2005; Nahas et al., 2003; Nigg et al., 2005). This model maintained that a person moves through a series of stages usually in a cyclical in manner in his effort to change behaviour (Reed, 1999). These five stages of exercise change (Callaghan et al., 2010; Carron et al., 2003; Marcus et al., 1992d; Paschal, Lewis-Moss, Sly, & White, 2010; Prochaska & Marcus, 1994) are:-

Stage 1: Pre-contemplation

This is the first of the five stages which Reed, (1999) term as *"I won't or I can't" stage.* Individuals in this stage are inactive and not even thinking about participating in exercise. Reed (1999) stated that the main characteristic of Pre-contemplators is the absence of intention to take action regardless of reason.

Individuals categorized in this stage is also the most difficult to change their behaviour because they do not think regular physical activity is important (pre-contemplation non-believers). For those who do believe in the importance of regular physical activity, they are somewhat overwhelmed by barriers such as lack of time (pre-contemplation believers). Therefore, educating them with regards to their unhealthy behaviour is paramount in helping them to becoming more healthy (Carron et al., 2003)

Stage 2: Contemplation

The second stage of change is termed contemplation. Individuals who are in this stage are inactive and are aware that they have a problem and are considering becoming active within the next six months. These contemplators acknowledge the need to change their unhealthy behaviour because they can see the benefits of changing the unhealthy behaviour. This so called *"I might"* group while acknowledging the importance of physical activity, also admit that engaging in physical activity will restrict them from doing other things such as spending time with family and friends.

Contemplators usually are open to new information and keen to know more about the benefits of change (Reed, 1999). They are however not committed to the change because they are only just contemplating about it and may never move beyond the information gathering phase and hence become chronic contemplators (Carron et al., 2003)

Stage 3: Preparation

In the preparation stage or the "I might" stage represent individuals who are seriously planning to change their physical activity level in the near future usually within the next 30 days. According to Reed and colleagues, the preparation stage has both a behavioural (such as purchasing a pair of jogging shoes or enrolling in a fitness training programme) and an intentional (such as intending to increase the frequency or intensity of their jogging session) component.

Individuals categorized into this group may have the intention to start exercising in the near future and typically have a plan of action to increase their physical activity levels. For example, individuals may have initiated a limited programme of exercise but have yet reached the recommended levels (such as exercising only on weekend rather than at least three times a week as recommended). The Preparation stage is a relatively unstable stage since individuals in this stage have strong incentives to change based on their optimistic views about beneficial outcomes (Carron et al., 2003). Hence, individuals in this stage are more likely to progress to higher stages (e.g. Action or Maintenance stage) compared to individuals who are in the pre-contemplation or contemplation stages.

Stage 4: Action

The fourth stage of change is the action stage. Action stage characterizes individuals who are currently active exercising at recommended level but they have not

yet maintained the exercising behaviour for more than six months. In order to be categorized within this stage, individuals must meet the minimum recommendations proposed by American College of Sports Medicine and Centers for Disease Control and Prevention (Reed, 1999). It is suggested that adults must exercise at least 30 minutes or more of moderate intensity on most, preferably all days of the week (Pate et al., 1995 in Carron et al., 2003).

Since individuals in action stage have only started to be regularly active in physical activity for less than six months, a period considered recent in behavioural change, attentiveness is necessary to check relapse (Callaghan et al., 2002; Marcus & Simkin, 1993).

Stage 5: Maintenance

The maintenance stage or "I have" stage represent individuals who have been exercising regularly at the recommended level for more than six months (Carron et al., 2003). Although in this stage, the new behaviour has become more habitual, individuals are still exposed to lapses and relapses due to boredom and loss of focus by individuals. Hence, in this stage the reinforcement of efforts in the improvement made through the various stages of change is extremely crucial.

Other researchers (Carron et al., 2003) have indicated the existence of another stage, the "termination" stage when individuals have zero temptation to engage in the old behaviour. However, Berger et al (2002) indicate that in the area of exercise, this is hard to achieve. There will always be temptations and therefore, targeting a lifetime of exercising at maintenance stage without having to reach the termination stage is already an ideal goal. Hence, in the current study the termination stage was not included.

b) Processes of Change

The second construct in the Transtheoretical Model is the processes of change. This model maintains that individuals in the different stages use different strategies or processes to facilitate movement to the next stage. These strategies, which can be in the form of behaviours, cognitions and emotions are used by individuals to help them progress through the various stages of change during the course of establishing a new desired behaviour.

The Transtheoretical Model offer ten processes of change that can be used by people to help them modify their behaviour (Prochaska & Marcus, 1994). These ten processes (the revised termed by Reed, 1999 are in brackets) are:-

1. Consciousness raising (gathering information)
2. Dramatic relief (being moved emotionally)
3. Social-liberation (taking advantage of social mores)
4. Self-reevaluation (developing a healthy image)
5. Environmental re-evaluation (being a role model)
6. Helping relationships (getting social support)
7. Counter-conditioning (making substitutions)
8. Self-liberation (making a commitment)
9. Reinforcement management (being rewarded)
10. Stimulus control (using cues)

These ten processes can be organized in a hierarchical manner of two higher-order constructs namely experiential or cognitive processes and behavioural processes (Prochaska & Marcus, 1994). It was hypothesized that experiential processes have a much more significant impact than the behavioural processes for the understanding and prediction of advancement in the earlier stages of change. On the

other hand, the behavioural processes seemed to be more important for understanding and prediction of progress in the later stages of change (Prochaska & Marcus, 1994). Some groups of people are more susceptible to physical inactivity and in need of the strategies as outlined in the Transtheoretical Model in order to help them progress to the next stage.

However, recent studies (Dishman, Vandenberg, Motl, & Nigg, 2010b; Wadsworth & Hallam, 2007) have found that people seem to utilize both cognitive and behavioural processes of change to help them increase or maintain exercising regularly. In addition, Rosen (2000a, 2000b) found that regardless of participants' stages of motivational readiness for change, individuals can still benefit from using cognitive processes to move through later stages of exercise contrary to the conventional beliefs that cognitive processes are more relevant in helping people at early stages of behaviour change (Brehm, 2004; Prochaska & Marcus, 1994; Reed, 1999). Given the inconsistency of the past findings, it would be very meaningful to investigate further in understanding the processes of change.

c) Self-Efficacy

The third construct of this model is self-efficacy. Self-efficacy, a key concept in Bandura's Social-cognitive theory (Marcus et al., 1992d; Nahas et al., 2003) has been integrated into the Transtheoretical Model due to its strong association with the stages of change (Sung, 2003). In the area of exercise, situations that disturb the routine are particularly challenging to adhere. Circumstances such as encountering bad weather, sustaining an injury, falling sick, inability to access gymnasium due to temporary closure are particularly very disruptive to maintaining a habit. This theory hypothesizes that the self-belief in one's ability to execute a particular behaviour is strongly related to the actual ability to perform that behaviour (Marcus et al., 1992d).

Self-efficacy in particular in the context of physical activity or exercise is the perception of individual efficacy or self-belief regarding one's ability to stay active on a regular basis. This theory further suggests that an individual's efficacy is situation-specific and may show discrepancy in relation to certain personal conditions such as in the state of fatigue or feeling unwell (Kim, 2007). Several studies (Kim, 2004; Marcus et al., 1992d; Nigg & Courneya, 1998; Prapavessis et al., 2004) have revealed the strong relationship between self-efficacy and the stages of change. In a study conducted by Marcus, Rakowski, & Rossi (1992b), revealed that individuals at different stages of change, have different degrees of exercise-specific self-efficacy and this suggest that individuals at various stages might benefit from different intervention approach. Self-efficacy is particularly important to help individuals who are in the later stages (in Action and Maintenance stage) to avoid relapsing (Reed, 1999).

d) Decisional Balance

Another construct of the Transtheoretical Model is the decisional balance. The decisional balance is based on the theoretical model of decision making proposed by Janis and Mann (Marcus et al., 1992b; Marshall & Biddle, 2001; Nigg, 2001; Prapavessis et al., 2004). Behaviour change is assumed to involve a systematic assessment of the potential benefits (Pros) and costs (Cons) associated with the intended behaviour change (Prochaska & Marcus, 1994; Sonstroem, 1988). The decisional balance between the benefits and costs is assumed to vary depending on which exercise stage of change one is in. When the Cons of exercise are assessed more important than the Pros of exercise, then the motivation to modify the behaviour (e.g. from sedentary to active in physical activity) will be low. On the other hand, if the Pros outweigh the Cons, then the inspiration will be higher to modify the behaviour.

In the early stages of change (i.e. pre-contemplation and contemplation stages), the Cons are believed to outweigh the Pros. In the preparation stage, the Pros and Cons are thought to be somewhat evenly balanced. However, during the later stages (i.e. in action and maintenance) the Pros are believed to prevail over the Cons. The Pros and Cons are clearly important for the understanding and the prediction of transition between the first three stages of change. However, during the action and maintenance stages, these decisional balance measures are less significant as predictors of progress (Reed, 1999).

2.5 Application of Transtheoretical Model in Exercise Behaviour

Numerous studies (Callaghan et al., 2002; Jordan et al., 2002; Kim, 2004; Kim et al., 2006b; Marcus et al., 1994; Marcus et al., 1992b; Marcus et al., 1992c; Marcus et al., 1992d; Nigg, 2001; Nigg & Courneya, 1998; Prapavessis et al., 2004) to date have applied the Transtheoretical Model to exercise behaviour.

The early application of this model was conducted at the University of Rhode Island (Sonstroem, 1988) involving 220 males over 30 years of age. The subjects were classified into four stages of change based on change stages identified by Prochaska and DiClemente (1983). These four stages of change were Pre-contemplators, contemplators, recruits (started on vigorous exercise programme for at least 20 minutes at 3 times a week within the past 2 years) and adherers (exercising at the recruit level for two or more years). The purpose of the study was to examine the applicability of the stage of change model for exercise adoption and to test the utility of belief statements in predicting stages of exercise. A major discriminant function comprising of nine belief statements produced a canonical *r* of .75 with stage of exercise adoption with a correct overall classification of 67.9%. Moreover, accuracy was consistent across stages ranging from 28.2% above baseline for recruits to 47.2% above baseline for adherers.

However, when 48 subjects who reported previous attrition from exercise (dropouts) were included in the analyses, classification of accuracy dropped to 50.9% and the group centroids for contemplators and dropouts were not significantly different ($p >$ .11). When 37 of these dropouts were recategorised as contemplators since they were considering joining another exercise programme, the overall accuracy increased to 60.3% and revealed significant differences between centroids of contemplators and dropouts ($p < .001$) indicating that dropouts consist of individuals who intend to resume participation in exercise and also those who do not.

While the initial application of the Transtheoretical Model to physical activity was carried out at the University of Rhode Island, majority of the studies using the Transtheoretical Model to study on exercise were however conducted by Marcus and her colleagues. They were working on the development of measurement and testing of model in the area of exercise adoption and adherence. For example, Marcus, Selby, Niaura, and Rossi (1992d) developed scales to measure stages of change for exercise and self-efficacy within the Transtheoretical Model. The five-item self-efficacy scale developed by Marcus and colleagues had an internal consistency of .76 and the reported test-retest reliability over a 2-week period was at .90 for the self-efficacy scale. The stage of change measure consisted of a five-item measure using a five-point Likert scale to rate each item. The Kappa index of reliability over a two-week period for the stages of change measure was .78. Marcus and colleagues studied the application of the stages of change and the self-efficacy to exercise to a sample of government employees (N = 1063) and hospital employees (N = 429). Thirty-nine percent of this sample of employees was found to be regularly engaging in physical activity (action or maintenance). Their study also revealed that scores on self-efficacy items significantly differentiated the employees at most stages of change. In their study, they found

Pre-contemplators scored the lowest in their self-efficacy measure while subjects in the maintenance stage had the highest self-efficacy scores.

Meanwhile working on a worksite health promotion project, Marcus, Rossi, Selby, Niaura, and Abrams (1992c) developed the processes of change for exercise questionnaires. They generated a collection of 110 items to measure the processes of change for exercise by mostly revising and adapting items from smoking cessation study and content validity was established through three doctoral-level judges classifying the items according to conceptual definitions of the following ten processes for exercise. From these 110 items generated, 65 items passed the initial judges assessment before being reduced to 39 items and retained as the final items to measure the processes of change for exercise.

Table 2.1

Description of the Processes of Change

Process	Description
Experiential processes	
• Consciousness raising (gathering information)	• Efforts by the individual to seek new information and to gain understanding and feedback about the problem
• Dramatic relief (being moved emotionally)	• Affective aspects of change, often involving intense emotional experiences related to the problem behaviour
• Environmental re-evaluation (being a role model)	• Consideration and assessment by the individual of how the problem affects the physical and social environments
• Self re-evaluation (developing a healthy self-image)	• Emotional and cognitive reappraisal of values by the individual with respect to the problem behaviour
• Social liberation (increasing health alternatives)	• Awareness, availability and acceptance by the individual of alternative, problem-free lifestyles in society

Table 2.1 (continued)

Behavioural processes	
• Counter conditioning (seeking alternatives)	• Substitution of alternative behaviours for the problem behaviour
• Helping relationships (getting social support)	• Trusting, accepting and utilizing the support of caring others during attempts to change the problem behaviour
• Reinforcement management (rewarding oneself)	• Changing the contingencies that control or maintain the problem behaviour
• Self-liberation (making a commitment)	• The individual's choice and commitment to change the problem behaviour, including the belief that one can change
• Stimulus control (using cues)	• Control of situations and other causes that trigger the problem behaviour

(Source:Marcus et al., 1992c)

These ten processes of change were regrouped into two higher-order constructs representing the cognitive processes of change and the behavioural processes of change (Prochaska & Marcus, 1994). There are four items representing each of the ten processes of change except for dramatic relief, which has only three items. Table 2.1 provides a brief description for the ten processes of change.

In another similar study, Marcus, Rakowski and Rossi (Marcus et al., 1992b) used employees from four worksites to develop a Decisional Balance measure for exercise to determine the relationships of decisional balance and the stages of change in exercise behaviour. Using principle components analysis, two factors were identified consisting one a 6-item component for reasons not to exercise representing the Cons dimension within the Transtheoretical Model for exercise. The second factor consist a 10-item component representing positives or Pros of exercise. The study revealed

significant association of Pros, Cons and a decisional balance (Pros minus Cons) with the stages of exercise adoption.

The validity of the stages of exercise adoption instrument was tested by Marcus and Simkin (1993). Both the stages of exercise questionnaire and the seven-day physical activity recall questionnaire were given to a sample of 235 employees. Results revealed that 51% of the employees were not active in physical activity (pre-contemplation and contemplation) and 49% were participating in regular exercise (preparation, Action and Maintenance). Scores on physical activity behaviour items significantly differentiated employees among the stages indicating that the stage of exercise instrument has concurrent validity with a well-accepted physical measure.

Later, Marcus, Eaton, Rossi, and Harlow (1994) examined the application of the Transtheoretical Model to the study of exercise behaviour using three independent constructs namely Pros of exercise, Cons of exercise and self-efficacy for exercise. On the whole, the results demonstrated that individuals' level of physical activity could be predicted through their stage of readiness for exercise, their perceptions of the costs (Cons) and benefits (Pros) of exercise and their self-efficacy for exercise.

Since then a significant number of research have been generated based on the Transtheoretical Model approach to study on physical activity (Barrett, 1997; Blanchfield, Cardinal, Lee, & Kim, 2006; Callaghan et al., 2002; Cardinal, 1995a; Cardinal, Tuominen, & Rintala, 2004; Fallon, Hausenblas, & Nigg, 2005; Gorely & Bruce, 2000; Gorely & Gordon, 1995; Heather, Claudio, Danielle Symons, David, & Daniel, 2002; Metzker, 1999; Nigg, 1996, 2003; Prapavessis et al., 2004; Sas-Nowosielski, 2007; Suminski & Petosa, 2002; Wadsworth & Hallam, 2007). Cardinal (1995) for example, assessed a scale he developed to measure stages of exercise based on the Transtheoretical Model and found that the scale was able to significantly and meaningfully differentiate between subjects classified by stage in five

out of six variables tested. However, in his study no subjects were classified in the two earlier stages of exercise (i.e. pre-contemplation and contemplation) because of difficulties in recruiting subjects in the earlier stages which he clarified may be due to social desirability biases with physical activity or exercise.

Gorely and Gordon (1995) also carried out a research using the Transtheoretical Model to study exercise behaviour change but among older adults (50 – 65 years). Results from the study revealed that self-efficacy, decisional balance (both Pros and Cons) and five out of 10 processes of change make significant and unique contributions to discriminate between the stages. Specifically, self-efficacy was shown to increase from pre-contemplation to maintenance, the balance between the benefits (Pros) and costs (Cons) was shown to change across the stages from pre-contemplation to maintenance while the processes of change were shown to fluctuate across the stages. Gorely and Gordon found that their findings support the idea that different constructs are more or less important at different stages of change. They found that pre-contemplation group used each process of change significantly less than individuals in all the other stages which were similar to findings of Marcus, Rossi, Selby, Niaura, and Abrams (1992c) suggesting that the pre-contemplation group make little effort to address their inactivity and its potential consequences. They also found out that individuals in the maintenance group continued to seek out information to reinforce participation and reconsidered their value system with respect to the role of exercise.

Later Nigg and Courneya (1998) conducted a study to examine adolescents exercise behaviour using the Transtheoretical Model involving a sample size of 819 students from five community high schools in Canada. In this study, all the Transtheoretical Model constructs comprising of stages of exercise change, processes of change, self-efficacy, and decisional balance were test. Nigg and Courneya found that the stage of exercise change distribution was biased towards the higher stages with

approximately 65 % of the participants placed in the action and maintenance stages. Less than 7 % of the sample was placed in the lower stages of pre-contemplation and contemplation. This study also revealed that all the processes of change used by the students were significantly differentiated at least at one of the stages of change. These results were consistent with the findings from previous studies conducted with sample from middle-age adults suggesting that adolescents also use processes of change in a similar manner as the adults. As for self-efficacy, the results showed that self-efficacy increased across the stages of exercise change. The findings were also consistent with previous studies (Gorely & Gordon, 1995; Marcus et al., 1992b; Marcus et al., 1992c; Marcus et al., 1992d). Nigg and Courneya (1998) suggested that similarity of this findings may be due to the universality nature of the self-efficacy construct. Nigg and Courneya also found that the Pros increased across the stages of exercise change whereas the Cons decreased as the stages of exercise got higher. They also concluded that participants in the lower stages focused more on the negatives aspects of exercising whereas those in the higher stages focused on the positive aspects of exercising.

Callaghan and colleagues (2002) also conducted a similar study to test the Transtheoretical Model in relation to exercise behaviour among young Chinese students and found that those that can be classified under the active group (comprising students in the Action and Maintenance stages) were only 29.2% when compared with British students (43 %, Buxton, Wyse and Mercer, 1996) and Canadian high school students (65%, Nigg & Courneya, 1998) which supported an earlier study by Lindner (1998, cited in Callaghan et al., 2002) that young Chinese students exercise less compared with similar groups in other countries. Several reasons were suggested by Callaghan and colleagues for the low exercising level among the Chinese students. Among them, Callaghan and colleagues noted that the culture and the environment of Hong Kong are not conducive to exercise. Exercise is seen as a fun activity and hence a less important

activity than studying seriously. Lack of a comprehensive physical education programme was also the reason for the low priority given to exercising or physical activity. Again, like previous similar studies self-efficacy was found to increase across the stages of exercise change and for decisional balance, students in later stages of change was found to place greater emphasis on the benefits of exercise than students in the early stages. However, no significance was found for the slight bias of students in the early stages of change that placed more emphasis on barriers to exercising than students in the later stages.

Subsequently in an attempt to reconfirm the application of the Transtheoretical Model in adolescents exercise behaviour, a replication study was conducted in New Zealand by Prapavessis, Maddison, & Brading (2004). The results of this study showed high degree of similarity with the study conducted earlier by Nigg and Courneya (1998). Overall the results revealed that usage of processes of change, self-efficacy and decisional balance could distinguish the stages of exercise behaviour readiness in adolescents.

Another similar study was also carried out to examine the exercise behaviour of Korean adolescents (Kim, 2004). Kim found that 54.5% of the participants in his study reported being in the inactive stages. Specifically this inactive group was in pre-contemplation 17%, contemplation 16.6% and preparation 20.4%. The rationale given by Kim for the high incidence of inactivity of the Korean adolescent sample were similar to what has been suggested by Callaghan and colleagues (2002) were social and environmental limitations like inadequacy of facilities, lack of time to exercise and excessive schoolwork due to the overemphasis of an academic-centered curriculum.

Kim (2004) also examined the relationships of psychological variables within the stages of change model with exercise behaviour. All of the psychological variables were found to be statistically correlated with exercise behaviour and with self-efficacy

showing the strongest correlation with exercise. In fact, all the psychological variables accounted for 37% of the exercise behaviour with self-efficacy showing the greatest effect on exercise behaviour.

In an effort to predict exercise relapse among college students, Sullum, Clark and King (Kim, 2004; 2000) administered questionnaires to measure constructs based on the Transtheoretical Model in the form of processes of change self-efficacy, and decisional balance to 52 physically active college students. They found that both self-efficacy and decisional balance were predictive of exercise relapse but not the processes of change. However, the maintainers of exercise in their study showed higher use of both cognitive and behavioural processes when compared with the relapsers of exercise.

The transtheoretical model for physical activity was also tested to see if the underlying structure was invariant between genders, among various age groups and ethnicities. For instance, Paxton et al. (2008) found that measurement models for self-efficacy and the revised model for processes of change for physical activity have demonstrated sufficient evidence for invariance for genders, age-groups and ethnicities. However, a revised model of the decisional balance construct was only invariant between genders and ethnicities but not among age-groups. However, in another study, Cardinal et al. (2009) using a mixed culture sample, observed that besides the processes of change, weekly exercise behaviour and gender that were found to be significantly affiliated with the stages of change for physical activity, the interaction between nationality and gender was also found to be significantly related with the stages of change for physical activity suggesting of a possible influence of cultural differences on the participation in physical activity.

In another study, Bucksch and colleagues tested the transtheoretical model for physical activity on a school-based sample of German adolescents and revealed that in

general scores of the transtheoretical constructs specifically self-efficacy, Pros of the decisional balance and seven of the ten processes of change increased across the stages of change except for the Cons of the decisional balance construct. However, these constructs were unable to differentiate between the various stages of change and hence indicating the lack of validity for the five distinct stages of change for physical activity (Bucksch, Finne, & Kolip, 2008). They also suggested that it might be more practical to differentiate between individuals who have no intention to include physical activity in their daily life, with individuals who are ready to change or who have changed their behaviour recently and with individuals that have adhered to physical activity for a significant period of time. This suggestion is backed by several other studies (De Bourdeaudhuij et al., 2005; Marcus & Simkin, 1994).

Dishman et al. (2010b) provided longitudinal evidence from a multi-ethnic population base that support the usefulness of selected transtheoretical model constructs in predicting the maintenance or increase in the levels of physical activity. They also observed that contrary to transtheoretical theory, individuals appear to apply both experiential and behavioural processes in their efforts to increase or maintain their physical activity level. This finding is not surprising as several previous studies have also indicated similar findings. Comparable findings were reported by Wadsworth and Hallam (2007) and Dishman and colleagues (2010b) who found that individuals utilized both cognitive and behavioural processes in their attempts to maintain their physical activity. In another study, Hwang and Kim (2011) who used Asian sample also confirmed that the use of cognitive and behavioural processes increased with advancing stages of exercise change and that their study provides convincing evidence that engaging and maintaining of physical activity behaviour need the practical application of both cognitive and behavioural strategies.

In more recent studies, Callaghan and colleagues (2010) in their investigation on the usefulness of the transtheoretical model of change in predicting exercise behaviour among young Chinese found that the transtheoretical model of change was only modest in predicting the future stage of change for exercise. Self-efficacy, pros and behavioural processes of change were among the transtheoretical model constructs that appear to be the strongest predictors of future stage of change for exercise.

Several past studies (Kosma et al., 2007; Marcus et al., 1994) have also indicated that stages of behaviour change have served as a mediating role in physical activity change. For example in their study to examine the relationships of the stages of readiness to exercise with self-efficacy, the perceived costs (Cons) and benefits (Pros) of exercising and self-reported physical activity participation, Marcus, Eaton, Rossi, and Harlow (1994) they found that the direct paths from the independent constructs (self-efficacy, Pros, Cons) to physical activity was not significant indicating the strong mediating effect of the stages of readiness of exercise. Participants with high Pros, low Cons, and high self-efficacy scores are related to high physical activity only indirectly, that is through the mediation of the stages of change.

In another study to identify the mediating role of intention and the stages of change (SOC) in physical activity by integrating the Theory of Planned Behaviour with the Stages of Change (Transtheoretical Model), Kosma and colleagues (2007) found that SOC was a stronger predictor of future physical activity than intention and that attitude has the highest effect on SOC. The direct effect of attitude on physical activities was not significant and that the indirect effect of attitude approached a full mediation on physical activity through SOC.

Literature review revealed that in recent years, studies have been conducted through multi-theoretical approach (Grodesky, Kosma, & Solmon, 2006; Jordan et al., 2002; Kosma et al., 2007) for instance, incorporating constructs of the Transtheoretical

Model such as self-efficacy, processes of change and decisional balance with constructs from other different theoretical framework (e.g. Theory of Planned Behaviour, Self-Determination Theory) in order to improve the predictive strength of physical activity determinants. It seems unlikely that a single theory can truly explain an individual's motivations and behavioural patterns when considering the complexity of physical activity behaviour change (Grodesky et al., 2006).

While there are numerous studies conducted using constructs of the Transtheoretical Model such as self-efficacy, processes of change and decisional balance with constructs from other theories (Grodesky et al., 2006; Jordan et al., 2002; Kosma et al., 2007) , only one study (Wyse, Mercer, Ashpord, Buxton, & Gleeson, 1995) is sighted in the literature review that integrates physical self-perception with constructs from the Transtheoretical Model to examine exercise behaviour. Therefore, this study extended the research by incorporating physical self-perception into the Transtheoretical Model and examines its applicability in strengthening the understanding of exercise behaviour change.

2.6 Physical Self-Perception

In attempting to identify factors that are related to the exercise behaviour, a large body of research has also focused on the role of the self in exercise behaviour (Boyd et al., 2002; Fox & Corbin, 1989; Lindwall & Hassmen, 2004; Welk et al., 1997; Whitehead, 1995). As suggested by Kendzierski (1990), self is an important variable in the exercise domain. How a person perceives oneself is important in his/her attempts to change a lifestyle such as in exercising. The rationale for this is that if an individual feels positively about oneself in a particular domain such as in physical activity, then he is more likely to pursue and achieve the desire outcomes in the domain than a person who does not feel positively about himself (Marsh et al., 2006). Hence, one theoretical

approach to understand exercise behaviour is to examine the physical self-perception of individuals in relationships to their exercise behaviour.

The study of physical self-perceptions has its origins from the research work conducted in the area of self-esteem. Defined broadly, self-esteem is the favourable views one holds regarding one's self (McAuley, Mihalko, & Bane, 1997) but according to Berger et al. (2002) a variety of terms have been used in this field, and thus making it vital to differentiate these terms. Fox (1997) as cited in Burger et al. provide the different perceptive of *self* as follow; *Self-concept* is a self-description of individual as known to the individual based on the roles and attributes that one considers makes up of oneself. *Self-esteem* on the other hand denotes the awareness of good possessed by the self. This term has the same meaning with *self-worth*. *Self-perception* is an umbrella term that represents all types of self-referent about the self both global and specific in content.

An enhanced positive self-concept has been often hypothesized as facilitating the attainment of desired outcomes such as exercise adherence or global well-being (Marsh, Hey, Roche, & Perry, 1997). Lindwall & Hassmen (2004) noted that the physical body and aspects of appearance have been found to be the strongest predictors of global self-esteem which had led to the interest in individuals physical self-perceptions and their link to exercise behaviour. Perceptions of competence in the form of physical self-perceptions, serve as measure of self-esteem in the physical domain and have been sown to reliably predicted exercise behaviour (Fox & Corbin, 1989). An assessment on 36 studies related to exercise showed that 78% of these studies indicated positive changes on some aspects of self-esteem or self-concept (Fox, 2000).

According to Fox, (cited in Duda, 1998), our body provides the medium through which we interface with life and therefore our perception of our physical selves provide the key to the understanding of our identities and our behaviour patterns. Therefore as

noted by Fox, it was not surprising that many theories of motivation for exercise are originated from the studies on self-concept or self-perception and applied to the physical domain.

Contemporary theorists have considered the self-concept to be a multidimensional construct (Boyd et al., 2002; Duda, 1998) based on the model proposed by Shavelson, Hubner & Stanton (1976, cited in Fox & Corbin, 1989) which was initially intended for an educational setting. This multidimensional concept has global self-esteem as the apex of the hierarchical system and it is further divided into situation-specific subordinate domains of self-esteem such as academic, social, emotional and physical. Each of these domains can be further divided into even greater specificity sub-domains. This model has been adopted in the sport and exercise field and emphasized the significance of competence perceptions to the development of intrinsic motivation for physical activity, behavioural choice, intensity and persistence (Fox & Corbin, 1989).

In an effort to understand self-concept structure and behaviours in the physical domain, Fox and Corbin (1989) developed and validated the physical self-perception profile (PSPP) based on Shavelson et al (1976) multidimensional and hierarchical model of self-concept. The PSPP is a 30-item scale which measures the physical self-worth at the domain level through a 6-item scale and another four 6-item subscales each for assessing one of the four sub-domains of the physical self-perception which are physical conditioning, sport competence, physical strength and body attractiveness.

Besides this, contemporary work in the physical domain has also incorporated the perceived importance and perceived competence constructs to understand the changes in self-esteem. Both the perceived importance of certain competencies of an individual and the amount of competence experienced by the individual must be taken into account when explaining the levels of self-esteem. Studies have shown that

children and adolescents had lower levels of self-esteem when they thought they were incompetent in achievement areas that they valued (Ebbeck & Stuart, 1996). In this aspect, Fox and Corbin (1989) had also developed an accompanying perceived importance profile to measure the importance that people attach to the four sub-domains of PSPP.

Some studies have demonstrated that women in particular have concerns about their body image (Burger & Dolny, 2002; Kylie et al., 2000). It has been shown that women were more concerned with their appearance and weight (Burger & Dolny, 2002; Kylie et al., 2000). However, women generally displayed lower physical self-perception scores when compared to the men (Lindwall & Hassmen, 2004; Moreno & Cervello, 2005). In another study Caglar and Asci (2006), found that male participants have consistently scored higher than the female participants on three physical self-perception subscales; perceived sport competence, physical condition and physical strength.

Research on exercise adherence have shown that subjects were motivated to higher levels of exercise when they perceived themselves to be more competent in athletic endeavours. For example, Daley and Leahy (2003) in their study on school adolescents found that participants involved in extra-curricular physical activities had higher self-perceptions compared to adolescents who did not participate in extra-curricular physical activities.

In a more recent study Moreno and Cervello (2005) found that subjects who participated in physical activity more than three times a week showed better scores in their physical self-perception than those who participated in physical activity less than three times per week. These findings were consistent with the study conducted by Caglar and Asci (2006). They found that participants in the high physical activity group scored significantly higher in all subdomains of the PSPP than participants from the low

physical activity groups. These results suggest that physical self-perception has a positive relationship with exercise adherence.

In another study, Marsh, Papaioannou, and Theodorakis (1994) found that more positive levels of prior self-concept led to higher subsequent levels of exercise behaviour and higher levels of prior exercise behaviour led to higher levels of subsequent physical self-concept. The reciprocal effects model in Marsh et al. study implied that physical self-concept and exercise behaviour are reciprocally related and mutually reinforcing and therefore physical education teachers and health care providers should try to enhance both physical self-concept and exercise behaviour simultaneously.

Nevertheless, there are also studies that indicated physical self-perception has an inverse relationship with exercise adherence. For example, Douthitt (1994) in her study found that male subjects who perceived themselves low in romantic appeal increase their physical activity and female subjects with low perceived athletic competency increase their physical activity.

Different population groups have also been studied from the perspective of the Transtheoretical Model, but no study has yet been sighted from past research that studied on teacher trainees (a group that has great potential in shaping and reinforcing the active lifestyle of the children and may determine the future active involvement of the younger generation in physical activity) using the Transtheoretical Model. Hence, this study proposed to incorporate physical self-perception into the Transtheoretical Model and to examine whether its application would further strengthen the understanding of exercise behaviour change among the Malaysian teacher trainees.

2.7 Conclusion

Through this chapter, we have learned that even though the positive information being conveyed about exercising, there is still a large population who do not exercise

regularly enough to gain the positive benefits both physiologically and psychologically. One way to understand this phenomenon and eventually to help people to get involved and to stay active exercising is through an understanding of the models that have been developed to predict exercise behaviour. Although there are numerous models of exercise behaviour, the Transtheoretical Model (also known as Stages of Change Model) holds promise of a fitting tool for assessing of exercise behaviour.

Various literature review indicated that in recent years, more studies have been conducted through multi-theoretical approach as it is unlikely that a single theory can truly explain an individual's motivations and behavioural patterns when considering the complexity of physical activity behaviour change (Grodesky et al., 2006). Hence, this study incorporated physical self-perception as a construct into the Transtheoretical Model and examined its applicability in strengthening the understanding of the exercise behaviour change from a sample of Malaysian teacher trainees.

CHAPTER 3

METHODOLOGY

3.0 Introduction

The purpose of this study was to assess the exercise behaviour among the Malaysian teacher trainees. Specifically, this study attempted to

a) determine the physical activity level of the Malaysian teacher trainees;

b) determine the proportion of Malaysian teacher trainees in the different exercise stages;

c) investigate the self-efficacy for exercise, the decisional balance for exercise, the processes of change for exercise and the physical self-perception profile of the Malaysian teacher trainees;

d) determine the relative strength of the hypothesized psychological sources of influences namely (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees;

e) determine whether the proposed model for exercise/physical activity fit the data collected

This chapter presents a description of the research approach used in this study to assess the exercise behaviour among the Malaysian teacher trainees under the following subtopics

i) the research design,

ii) population and sample (participants),

iii) instrumentation,

iv) data collection and procedures,

v) data analysis.

3.1 Research Design

This study aimed to describe the exercise behaviour among the Malaysian teacher trainees and therefore it employed a descriptive research approach. According to Ary, Jacobs and Razaveih (1990), descriptive research studies are designed to gather information concerning the current status of a phenomenon. Its aim is to describe "what exist" with respect to variables or conditions in a situation by asking questions about the nature, incidence, or distribution of variables and/or the relationship among these variables.

This study used the cross-sectional survey design and employed the questionnaire method to obtain the intended data for assessing the exercise behaviour of the Malaysian teacher trainees. As suggested by De Vaus (2001), cross-sectional designs are ideally suited for descriptive research and have been widely used for these purposes. In cross-sectional design, the data are collected at one particular point in time to describe what existed at that point of time. Furthermore, survey design using questionnaire is an efficient way to collect a lot of information on a large sample in a relatively short period of time (Mitchell & Jolley, 2004) similar to the task undertaken in this study.

Several self-report questionnaires were used in this study to collect the required data. Through prearranged appointment, the questionnaires were administered directly to the participants (teacher trainees) in their respective classroom. The participants were briefed on the questionnaires before it was administered to the participants. The administration of the questionnaires took place in one sitting at the participating institutions and was administered by the researcher and his assistants. The instrument

was administered to the participants of the eight participating institutions on an institute-to-institute basis over a period of two to four weeks.

3.2 Population and Sample

The target population for this study was the Malaysian teacher trainees who were pursuing the Program Ijazah Sarjana Muda Perguruan (PISMP) in the teacher training institutions in Malaysia between the ages 18 to 25 years old. This programme is a five and a half year full-time course consisting of a three-semester foundation course and another eight semesters of classroom based courses and school based practical training. Teacher trainees were selected over teachers in schools as the target population in this study because teacher trainees served as the future advocates of physically active lifestyle through the curriculum of physical education to our young generations. With this unique opportunity in the training institutions, they can be moulded to become better role models to their future students and therefore it would be crucial to examine and understand their exercise behaviour.

Based on the statistics provided by the Ministry of Education Malaysia, currently there were 27 teachers training institutions nationwide with an estimate population of 28,755 trainees (Ministry of Education Malaysia, 2006). However, due to geographical constraints, the accessible population was confined to within West Malaysia. Hence, this study only focused on teacher trainees who were pursuing teacher training programme in the various teacher training institutions in West Malaysia.

A two-stage cluster random sampling technique was employed for this study. The sample for this study came from eight randomly selected teacher training institutions listed under the Teachers Training Division, Ministry of Education. As West Malaysia can conveniently be divided into four regions namely the Northern Region,

the Central Region, the East Coast Region, and the Southern Region; four zones were created to represent these four regions.

Each teacher training institute was first assigned a number and clustered according to the zone they came from. Then two teacher training institutions from each zone were randomly selected to ensure a representative sample from all the regions within West Malaysia. Participants from the selected institutions were then selected using the cluster sampling technique where four clusters or intact classes of trainees (each class with approximately 25 trainees) were randomly chosen from each of the selected eight institutions to be the participants for the study. With an estimated population of 28,755 trainees throughout the nation, a required sample size of 377 is deemed sufficient to represent the population with a confidence level of 95% and a desired accuracy within 5% of the true percentage of the population (Mitchell & Jolley, 2004).

The following illustrates how the overall sample size was drawn from the target population.

No. of zones	No. of institutes selected	No. of Group/Class selected	Estimated no. of trainees in a class	Total participants
4	2	4	25	800

Several of the questionnaires were not properly completed and therefore were not included in the reporting of the results of the present study. The final number of participants involved in the study was 754 out of which 306 (40.6%) were males and 448 (59.4%) were females.

3.3 Instruments

The data for this study were collected through a set of questionnaires consisting of 7 sections with each section measuring each of variables that are relevant to the purpose of the study. The various sections of the questionnaire are described as follow:

A. The Demographic Questionnaires (DQ)

The Demographic Questionnaires (DQ) was designed by the researcher to gather demographic information of the participants including age, gender, ethnicity, academic qualification, subject major (specialization), past and current involvement in sport/physical activity. Refer to Appendix 1A (Bahasa Malaysia version) and Appendix1B (English version) for the Demographic Questionnaire (DQ).

B. Leisure Time Exercise Questionnaire (LTEQ)

Leisure Time Exercise Questionnaire (LTEQ) is a self-report questionnaire relating to physical participation developed by Godin and Shephard (1985). This self-report level of physical activity instrument consisted of two questions.

Question 1 asks the participants to respond to the question "Considering a 7-day period, how many times on average do you do the following kinds of exercise for more than 15 minutes at a time during your free (leisure) time?" This question has three categories of physical activities comprising of strenuous (heart beat rapidly), moderate (not exhausting), and light activities (minimal effort) and participants are to respond by indicating the weekly frequencies for each of the three categories. These frequencies are then multiplied by an arbitrary unit of nine, five, and three METS respectively. The total weekly leisure activity in arbitrary units is determined by summing up the products of the separate components. The following formula illustrates the calculation of the Weekly Leisure time Activity.

Weekly Leisure time Activity = (9 x *strenuous) + (5* x *moderate) + (3* x *light)*

Question 2 of the LTEQ asks the participants to answer to the question "Considering a 7-day period, during your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beat rapidly)?" This second question has three categories of response comprising of often, sometimes and seldom/never. Participants respond to the question by checking on one of the three choices of response. This second question is used to calculate the frequency of responses to the question regarding the frequency of weekly leisure-time activity 'long enough to work up a sweat" for example, if Strenuous activity = 3 times/week, Moderate activity = 6 times/week and Light activity= 14 times/week, then the

Total leisure activity score = (9 x *3) + (5* x *6) + (3* x *14)*

= 27 + 30 + 42 = 99

The two questions in this measure were developed primarily to determine quantity of sweat-induced physical activity during leisure time. The numbers of days of sweat induced physical activity has been found to correlate with VO_{2max} (r = 0.46) (Siconolfi, Lasater, Snow, & Carleton, 1985) and treadmill time to exhaustion (r = 0.51) (Kohl, Blair, Paffenbarger, Macera, & Kronenfeld, 1988).

In addition, this approach was selected because of the practicality of assessing physical activity level involving large sample size. This approach was demonstrated by Leenders, Silver, White, Buckworth and Sherman (2002) and Sung (2003) who used almost similar methods to assess physical activity level in their studies. See Appendix 2A (Bahasa Malaysia) and Appendix 2B (English version) for the Physical Activity Questionnaire (PAQ).

C. The **Stage of Change Questionnaire (SCQ)**

The Stage of Change Questionnaire (SCQ) was adapted from research work on smoking cessation (DiClemente et al. 1991; Prochaska & DiClemente, 1983) by Marcus, et al. (1992) to describe the participants' current stage of exercise and has a reported Kappa Index of reliability of 0.78 taken over a 2-week period (N = 20).

Courneya (1995) has further adapted this instrument and reported a 2-week test-retest reliability of 0.79 (N = 148). Concurrent validity for this measure was established by its significant association with the Seven Day Recall Physical Activity Questionnaire (Marcus & Simkin, 1993). The stages of change questionnaire was also substantiated by Murphy (1993) through the use of a step-test, exercise history questionnaire, and exercise intention questionnaire. Construct validity was also established by Cardinal (1995a, 1995b). Cardinal's study shows that the scale was able to significantly ($p < .001$) and meaningfully (w^2 ranged from .15 to .38) differentiate between subjects classified by stage on five (exercise METS, frequency of sweating, physical activity rating, difficulty with relapse, VO_{2peak}) out of six (body fat percentage - not significant, $p > .20$ and $w^2 = .02$) variants studied.

The current study employed the Courneya (1995) version of this instrument. In this version, one item with five statements that represent each stage of exercise is provided. The participants are required to select only one statement that best describes their current exercise status based on the five statements each representing the different stage of exercise change. For example, a respondent who select the statement "*I currently do not engage in exercise in my leisure time, and I am not thinking about starting*" will be placed in the pre-contemplation stage. Refer to Appendix 3A (Bahasa Malaysia) and Appendix 3B (English version) for the Stages of Change Questionnaire (SCQ) showing all the five statements each representing one stage of change specifically; pre-contemplation, contemplation, preparation, action, and maintenance.

D. **The Self-efficacy Scale Questionnaire (SEQ)**

The Self-efficacy Scale Questionnaire (SEQ) was developed by Marcus, et al. (1992) to measures participants' situational confidence in the ability to persist with exercising in various situations. Marcus, et al. (1992) reported internal consistency of 0.82 and a test-retest reliability of 0.90 (N = 20) over a 2-week period for the measure. Later Nigg and Courneya (1998) include an additional five items that are specifically associated to adolescents' exercise self-efficacy to the five original items related to general exercise self-efficacy. The alpha value of 0.85 was reported. The five new items have its content validated through the endorsement of one doctoral and two masters-level experts based on what were perceived to be important barriers to exercise for adolescents (Nigg & Courneya, 1998). The present study employed Nigg and Courneya's (1998) version of the instrument to assess the participants' confidence in their ability to engage in exercise across a variety of situations.

Participants respond to a 5 point Likert Scale from 1 (not at all confident) to 5 (completely confident) for each of the 10 items that starts with a stem question: *"I am confident I can participate in regular exercise when …"*. An example of an item in this questionnaire will be *"I am confident I can participate in regular exercise when I am tired*".

In addition, for the purpose of this study, item 5 of the original SEQ by Marcus et al (1992), specifically "It is raining, or snowing" has been modified to "It is raining, or very hot" to reflect the Malaysian weather conditions following a similar change made by Callaghan, Eves, Norman, Chang, and Yuk Lung (2002) in their study conducted in Hong Kong. The test-retest reliability over a 2-week period for the original version was .90 (N = 20).

The mean scores of this self-efficacy construct were calculated by summing the 10 items scores and dividing by the number of items. Higher scores will indicate higher self-efficacy. See Appendix 4A (Bahasa Malaysia) and Appendix 4B (English version) for the complete 10 items of Self-Efficacy Questionnaires (SEQ).

E. Decisional Balance Questionnaire (DBQ)

The Decisional Balance Questionnaire (DBQ) designed by Marcus, Rakowski and Rossi (Marcus et al., 1992b) was used in this study to measures individuals assessment of the perceived importance of the benefits (Pros) and costs (Cons) of changing exercise behaviour. Construct validity reported for this measure was substantiated by subjecting the items to a principle-components analysis with varimax rotation. Only items with loading of more than .50 or greater and if items did not load on another factor were retained resulting in this 16-item measure consisting of two sub-scales with 10 items representing the benefits or positive aspects of exercise and another six items representing the costs or negative aspects of exercise. The internal consistency reported for the 10 items positive scale was 0.95 and 0.79 for the six items negative scale.

Participants were asked to indicate how important each statement is with respect to their decision to exercise or not by using a 5 point Likert scale ranging from 1 (not at all important) to 5 (extremely important). An example for a positive item is "*I would sleep more soundly if I exercised regularly*." and an example of a negative item is "*Regular exercise would take too much of my time.*" The Decisional Balance scale of Pros and Cons were scored separately. The mean scores of the 10 Pros items and the six Cons items were calculate by summing up the participants' responses to the 10 Pros items and six Cons items separately and dividing them by the number of items

respectively. Refer to Appendix 5A (Bahasa Malaysia) and Appendix 5B (English version) for the Decisional Balance Questionnaires (DBQ).

F. **Process of Change Questionnaire (PCQ)**

The Process of Change Questionnaire (PCQ) developed by Marcus, Rossi, Selby, Niaura and Abrams (1992c) was employed to measure the covert (cognitive) and overt (behavioural) actions used by individuals as they progress through the various stages of change.

This 39-item scale, represent 10 processes of change, which can be further, organized into two higher order constructs, specifically the cognitive or experiential process, and the behavioural process. Content validity for this measure was established through the agreement of three doctoral-level experts who classified the items according to the conceptual definitions of the 10 processes of change (Marcus et al., 1992c; Wadsworth & Hallam, 2007). The alpha values from .62 to .89 were reported by Marcus, et al. (1992) for the 10 processes of change. Participants were asked to recall over the past one month and rate the frequency of occurrence of each item. Participants respond to each of the item using a 5 point Likert scale ranging from 1 (never) to 5 (repeatedly). In this study, the 10 processes of change were individually scored. The mean scores for each of the processes of change were calculated by summing up the participants' responses to each processes of change separately and dividing by the number of items respectively. See Appendix 6A (Bahasa Malaysia) and Appendix 6B (English version) for the complete set of the 39 items for Processes of Change Questionnaires (PCQ).

G. **Physical Self-Perception Profile (PSPP)**

Physical Self-Perception Profile (PSPP) was developed by Fox and Corbin (1989) to measure the sub-domains of self-esteem in the physical domain in an effort to predict physical activity level (Boyd et al., 2002; Fox & Corbin, 1989; Sonstroem, Speliotis, & Fava, 1992). The PSPP consists of 30 items self-report questionnaires consisting of one scale assessing the general physical self-worth at domain level and four 6-item subscales measuring each of the four sub-domains of the physical self-perceptions namely;

a) Perceived sport competent (sport),
b) Perceived Physical conditioning (condition)
c) Perceived Bodily attractiveness (body)
d) Perceived Physical strength (strength)

However, the Physical Self Worth scale and the Bodily Attractiveness scale has been found to factor overlap by Sonstroem et al., (1992) and Boyd, et al., (2002). Hence, in this study, the Physical Self Worth scale at domain level of the physical self-perceptions will not be included in the study. Only the four sub-domains of the physical self-perceptions were used in this study.

The PPSP measure was validated by Sonstroem, Speliotis, and Fava (1992). When principal-component analyses with varimax rotation was conducted on only the 24 items of the four subdomains scales, a near perfect separation of items into the four hypothesized components was revealed indicating the four subdomain scales were tapping four independent categories of perceived physical competence in physical activity. The criterion validity of the PSPP using canonical correlation indicates that the PSPP scales were able to predict significantly ($p < .001$) the self-report degree of exercise participation for both females ($R = .73$) and males ($R = .64$).

For each item, two alternative statements or descriptions were presented from which the participants are asked to choose which statement best represent them before finally indicating whether the statement chosen is "*sort of true for me*" or "*really true for me*". This structure alternative item format is said to be able to overcome the problems of participants' tendency to give socially desirable responses. Each item was then scored from 1 (low) to 4 (high) and summed up to obtain a total score for each sub-domain. See Appendix 7A (Bahasa Malaysia) and Appendix 7B (English version) for the complete 24 items of the four sub-domains of the physical self-perception scale.

3.4 Pilot Study

Pilot testing was conducted on the instruments used in this study to establish face validity and reliability of the questionnaires and to improve the questions, format and scales (Creswell, 2008). All of the above instruments for the proposed study were first translated to the local language (Bahasa Malaysia) for local use according to a standardized back-translation procedure. The original English version of the instruments was first translated into Bahasa Malaysia and send to two bilingual experts (English-Bahasa Malaysia) who then translated them back to English. Variations in the versions were reviewed to rectify the differences such as grammar and choice of words.

The finalized version was tested in a pilot study with a representative sample of 151 participants who were undergoing the foundation courses for the Program Ijazah Sarjana Muda Perguruan (PISMP) in one of the teacher training institutes in Malaysia. Prior to the administration of the questionnaires, the participants were briefed on the intent of the study and assured of confidentiality on information provided by them. They were also encouraged to seek further clarification on the items from the researcher, should the needs arise when responding to them.

The process of responding to the items took approximately 30 to 40 minutes. A short discussion was held with the participants to seek feedback and suggestions for fine-tuning of the questionnaires. Feedback from the participants revealed only minor errors such as spelling mistakes and certain choice of words, which were rectified in the instruments to be used in the actual study.

The Cronbach's alphas (reliability analysis) for the questionnaires in the pilot study were as shown in Table 3.1

Table 3.1

Cronbach's alpha (α) value for pilot study

Instruments	**α-value from original study**	**α-value from pilot study**
Self-Efficacy Questionnaire (SEQ) (Nigg & Courneya, 1998 adapted from Marcus, Rakowski et al., 1992)	α = .85 (10 items)	α = .67 (10 items)
Decisional Balance Questionnaire (DBQ) (Marcus, Rossi, et al., 1992)		
- Decisional balance (Pros **only)**	α = .95 (10 items)	α = .87 (10 items)
- Decisional balance (Cons **only)**	α = .79 (6 items)	α = .77 (6 items)
Processes Of Change Questionnaire (POCQ) (Marcus, Rossi, et al., 1992)	α values ranging from 0.62 to 0.89	α values ranging from 0.66 to 0.88
Physical Self-Perception Profile (PSPP) (Fox & Corbin, 1989) a) Perceived sport competence b) Perceived physical conditioning c) Perceived appearance d) Perceived strength	α values ranging from 0.81 to 0.92	α values ranging from 0.51 to 0.75

3.5 Data Collection and Procedures

Prior to conducting the study, permission from the various relevant authorities was obtained namely:

a) Firstly, written approval was obtained for the study at the ministry level from the Educational Planning Policy and Research Division (EPRD) of the Malaysian Ministry of Education. Following this, written permission was also be sought from the Teachers Training Division, Ministry of Education that handle all and responsible for matters relating to all teacher training institutions in Malaysia.

b) Upon getting the consent from Teachers Training Division, the researcher approached the administrators (principals) of the various teacher-training institutions to seek their consent for the study to be conducted in their institutions and to coordinate the data collection. These institutions were selected randomly from the list of teacher training institutions obtained from the Teachers Training Division, Ministry of Education. Participants were selected using cluster sampling technique (whole class) and the stratified sampling (participants from various option/major of studies) technique.

c) Following approval from the relevant authorities, arrangements were made with the contact persons (academic staff) approved by the institute administrators to coordinate the time for the administration of the questionnaires (instruments) of the study.

d) Through prearranged appointment, the researchers then met the participants (students) in their respective classroom. The participants were briefed on the questionnaire before it was administered to the participants.

e) The participants were instructed to work independently of each other and were encouraged to work quickly in completing the questionnaires. However, no time limit was placed on the participants to complete the questionnaires. The researchers

were present throughout the session to answer any question from the participants with regard to the questionnaires.

f) The administration of the questionnaires was conducted in one sitting at the participating institutions and was administered by the researcher and his assistants. The instrument was administered to the participants of the participating institutions on an institute-to-institute basis over a period of two to four weeks.

3.6 Data Analysis

SPSS ver. 16.0 programme was used to analyse data collected in this study. Both descriptive statistics and inferential statistics were used to analyse the data. The demographic variables such as gender, age group, ethnic group and their majors (area of specialization) in teacher training institutions were summarized using the descriptive statistics. The descriptive statistics such as percentage, frequencies, mean, and standard deviation were used to describe the demographic variables of the participants as well as their physical activity levels and their stages of exercise change of the participants.

At the same time, inferential statistics were used to examine the relationships between the demographic data and the psychological variables in terms of (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees. Specifically, the following statistical techniques were used to answer the research questions:-

Research Question 1:

What are the physical activity levels of the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

To determine the physical activity level of the Malaysian teacher trainees, percentages, means and standard deviations were used to illustrate the physical activity level of the Malaysian teacher trainees. Chi-square (χ^2) was performed to assess the relationships between the physical activity level of the Malaysian teacher trainees and their demographic information (age group, gender, and ethnicity).

Research Question 2:

What are the stages of exercise change of the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

To determine the proportion of Malaysian teacher trainees in the different exercise stages, frequencies and percentages were used to describe the proportion of Malaysian teacher trainees in the different exercise stages of the Malaysian teacher trainees. Similarly, chi-square (χ^2) was employed to assess the relationships between the different exercise stages of the Malaysian teacher trainees and their demographic information (age group, gender, and ethnicity).

Research Question 3:

What are the differences in the psychological variables in terms of (a) self-efficacy, (b) decisional balance (c) processes of change, and (d) physical self-perception profile among the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

To investigate the self-efficacy for exercise, the decisional balance for exercise, the processes of change for exercise and the physical self-perception profile of the Malaysian teacher trainees, multivariate analysis of variance (MANOVA) were used to determine mean differences across the categorical stages of change for self-efficacy, both the Pros and Cons of the decisional balance, the two processes of

change (i.e. cognitive processes of change, and behavioural processes of change), and the physical self-perception profiles (the four sub-domains are perceived sports competence, physical condition, body attractiveness, and physical strength).

A follow-up ANOVA were performed when significant mean differences were detected during MANOVA to ascertain the differences in the self-efficacy, decisional balance, processes of change and physical self-perception of the participants. A Scheffe post-hoc test was employed to locate significant differences across the different stages of exercise behaviour change. Alternatively the Games-Howell follow-up post hoc multiple comparisons test (Field, 2009; Howell, 2007; Levy & Cardinal, 2006; Meyers, Gamst, & Guarino, 2006) was employed to determine the source of differences when heterogeneity of variances is present.

Research Question 4:

What are the relative strength of the psychological variables in terms of (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees?

To determine the relative strength of the psychological variables in terms of (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees, the Pearson's correlations matrices of the Transtheoretical Model constructs were examined to determine the inter-relationships between them.

In addition, Multiple Analysis of Variances (MANOVA) was performed to determine the differences of the Transtheoretical Model constructs (self-efficacy, decisional balance, and processes of change) and the physical self-perception profile

across the different stages of exercise behaviour among the Malaysian teacher trainees. All statistical analyses in this study are set at $p < .05$.

Research Question 5:

Does the proposed model for exercise/physical activity fits data collected?

To determine whether the proposed model for exercise / physical activity fits the data collected, the full structural model were specified and estimated using AMOS statistical programme. The criteria for the assessment of the structural model included the chi-square (χ^2) goodness-of-fit index. Alternative index of fitness such as CFI, RMSEA were also used to assess the fit.

The path significance indicated by the standard regression estimate assesses the effect of one variable on another variable. The standardized regression estimates are also measures of the validity of the indicator variables of each construct or factor. The direct, indirect and total effects of the variables were assessed among the latent variables. The significance level was set at $p < .05$. The evaluation of the proposed model was made by examining the criteria of fit and if necessary the model were re-specified for better fit when theoretically justifiable.

a) Model Testing

The proposed research model was assessed using the SEM statistical procedure. However, prior to this step, the measurement model which defines the relations between the observed (indicator) variables and the unobserved (latent) variables, were assessed. This was to ensure the measurement model fits the sample data before proceeding to a full model testing. The Analysis of Moment Structures (AMOS) statistical programme version 16 was used to evaluate the measurement models for self-efficacy for exercise, the decisional balance in the form of Pros and Cons for exercise, the processes of

change (cognitive processes and behavioural processes) and the physical self-perceptions (sport competence, physical condition, body attractiveness, physical strength). The structure equation modelling (SEM) confirmatory factor analysis (CFA) technique was used for scale measurement.

Once the overall fit of the measurement models using CFA were confirmed, the assessment of the structural model that defines the relations among the unobserved (latent) variables or factors were then conducted. A set of measures (fit indexes) were employed to determine how well the model fits the data collected. The following section described further the assessment of the measurement model and the structural model.

b) Measurement Model Testing

The assessment of the measurement model includes preliminary analysis to determine validity and reliability of the instrument. The validity of an item of a latent variable is determined by the magnitude of the standardized regression estimates (λ) value for the path from an indicator variable to the latent variable in the measurement model. The reliability of all the items in measuring the latent variable is also indicated by the magnitude of the squared multiple correlations (R^2).

The overall fit of the measurement model using CFA is obtained from the Maximum Likelihood estimation chi-square (χ^2) statistics and various goodness-of-fit indexes generated by AMOS programme. According to Kline (2005), χ^2 is actually a "badness-of-fit" index because the higher the value, the worse the model's correspondence to the data. He further suggests not relying solely on χ^2 statistic as it can be affected by size of correlations and by sample size. Specifically for this current study, in addition to the χ^2, fit indexes suggested by Kline, were used to determine the goodness of fit of the variables in the research model. Kline proposed the goodness of fit indexes that are currently in practice and recommended for report and interpretation

are the chi-square (χ^2), with smaller chi-square value the better along with a *p* value greater than .05, together with alternative indexes of fit such as Root Mean Square Error of Approximation (RMSEA) with value below of equal to .05 for close fit and values between .05 to .08 for reasonable error of approximation, and for Comparative Fit Index (CFI) with values greater than .90.

To reduce the number of manifest variables or indicators and facilitate model testing, item parcels were created for all the measuring items in this study. Items parcelling has been recommended for several reasons, including increased reliability, reduced idiosyncratic variance, the tendency for items parcels to be more normally distributed and a reduction in the ratio of measured variables to subjects (Coffman & MacCallum, 2005). In the view of Little, Cunningham, Sahar, and Widaman (2002), models with parcelled data are more parsimonious, have less chances for residuals to be correlated or dual loadings to emerge, and lead to reductions in various sources of sampling error.

c) Structural Model Testing

After the measurement models underlying the structural model have been confirmed through CFA, this is followed by the assessment of the full structural model. The structural model shows the causal relationship among the latent variables (Byrne, 2001). The full structural model was specified and estimated using AMOS statistical programme. The criteria for the assessment of the structural model are the same as the one used for measurement model testing.

The path significance indicated by the standard regression estimate assesses the effect of one variable on another variable. The standardized regression estimates are also measures of the validity of the indicator variables of each construct or factor. The direct, indirect and total effects of the variables were assessed among the latent

variables. The significance level was set at $p < .05$. The evaluation of the proposed model was made by examining the criteria of fit and if necessary the model will be re-specified for better fit when theoretically justifiable.

3.7 Conclusion

The purpose of this study was to assess the exercise behaviour of the teacher trainees in Malaysia. This study employed the survey method to gain a better understanding of the exercise behaviour among the Malaysian teacher trainees. A set of validated self-report questionnaires adapted from past studies were used to gather information from a sample of teacher trainees selected through cluster random sampling from eight Teacher Training Institutes which are representative of the four regions of West Malaysia. Both descriptive and inferential statistics were performed to analyse the data collected. The proposed model for exercise behaviour in this study was tested using the Structural Equation Modelling (SEM).

CHAPTER 4

RESULTS AND INTERPRETATIONS

4.0 Introduction

The purpose of the present study was to investigate the characteristics associated with the different stages of exercise behaviour change among a sample of teacher trainees in Malaysia. Specifically, this study attempted to ascertain the proportion of the Malaysian teacher trainees in the different stages of exercise, the differences in their processes of change, self-efficacy, decisional balance for exercise and their physical self-perception profile by the stages of exercise behaviour and the relationships among the various variables as mentioned.

This chapter presents the statistical analysis for the study. All analyses were performed using the Statistical Package for the Social sciences (SPSS) with AMOS version 16. Initially, descriptive statistics were employed to report the demographic background of the participants. This was followed by the report on the results of this study organized in accordance with the objectives and research questions of the study.

4.1 Data Screening

Prior to the advanced analyses, the data were examined to identify any missing data, outliers caused by data entry mistakes and possible violations of the multivariate normality assumption associated with maximum likelihood estimation (Kline, 1998). The results of the preliminary analysis revealed that there were some missing data. However, the number of missing data per item was not more than four (0.5 %) and hence decision was made to replace the missing data with the mean substitution method among the 754 participants in this study.

In addition, data were tested for normality that is essential in multivariate analysis. Testing the data compliance with the statistical assumptions underlying multivariate techniques deals with the foundation upon which the techniques make statistical inferences and results (Hair, Anderson, Tatham, & Black, 1998). Therefore meeting these assumptions will be critical to a successful analysis.

The most fundamental assumption in multivariate analysis is normality, which refers to the shape of the data distribution for a variable and its correspondence to the normal distribution. According to Kline (2005), to assume multivariate normality, three conditions should be fulfilled namely i) the distribution of all the univariate are normal ii) the joint distributions of any pair of variables is bivariate normal and iii) all bivariate scatterplots are linear and homoscedastic. Hair, Anderson, Tatham, and Black (1998) indicated that "although univariate normality does not guarantee multivariate normality, if all variables meet these requirements, then any departures from multivariate normally are usually inconsequential" (p. 349). Kline (2005) also stated that it is difficult to assess all aspects of multivariate normality due to the impracticable efforts needed to scrutinize all joint frequency distributions but fortunately many cases of multivariate violation of normality are detectable through inspection of univariate normality. Considering the predicament mentioned above, hence in this study, multivariate normality was assessed by testing the univariate normality.

Univariate normality for a single variable can be assessed both statistically and graphically. Two important statistical components of normality are skewness and kurtosis of the distribution. Skewness refers to the shape of distribution that is asymmetrical about its mean. Kurtosis on the other hand, refers to the peakness or the flatness of a distribution. A normally distributed variable will generate a skewness and kurtosis values that is close to zero.

There are various views on what constitute an unacceptable level of skewness and kurtosis for a specific variable. While there are some researchers who suggest using a conservative threshold of ± 0.5 as indicative of violations from normality, others prefer to be more moderate in their interpretation of ± 1.00 for departure from normality (Meyers et al., 2006). There are also researchers who opt for a more definitive assessment strategy to indicate departures from normality by dividing the skewness or kurtosis value by its respective standard error and comparing this value with the standard value of a normal curve (z-scores). In this aspect, Kline (2005) suggests that variables with absolute values in a univariate skewness index greater than 3.0 are considered, as extremely skewed while for kurtosis, absolute values above 8.0 is the indication of extreme kurtosis. Kline however cautioned that this strategy might not be useful in large samples because even slight deviation from normality is likely to be significant and hence rejected. Field (2009) explained that large sample will produce small standard errors and hence when sample sizes are large, small deviations from normality will produce significant values. He further suggested that with sample size greater than 200, it is probably more important to inspect visually the shape of the distribution and to look at the value of the skewness and kurtosis statistics rather than calculating their significance by comparing with the standard value of a normal curve (z-scores).

However prior to this, item parcels were created for all the measuring items in this study to reduce the number of manifest variables or indicators and facilitate model testing. Items parcelling has been recommended for several reasons, including increased reliability, reduced idiosyncratic variance, the tendency for items parcels to be more normally distributed and a reduction in the ratio of measured variables to subjects (Coffman & MacCallum, 2005). According to Little, Cunningham, Sahar, and Widaman (2002), parcelled data help to generate more parsimonious models, have less chances for residuals to be correlated or dual loadings to emerge, and lead to reductions in various

sources of sampling error. As stated by Little et al., the goal in developing measurement process is to measure the construct of interest in the best possible manner and since the present study focal interest is to examine the relations among the constructs, and not looking at the exact relations among the items, therefore parcelling is acceptable option.

There are several techniques that are currently being used for parcelling of items depending on the dimensionality of the items such as random assignment technique, item-to-construct balance technique, internal-consistency technique, and domain-representative approach (Little et al., 2002). The present study employed the item-to-construct balance approach to parcel the items for unidimensional measures and utilized the internal-consistency approach to parcel items with multidimensional items set. In internal-consistency technique, the parcels are created based on the facets as the grouping criteria (Little et al., 2002). For example, Parcel A would be the sum or average of items A_1, A_2 and A_3 from facet A.

4.2 Testing the Assumptions of Multivariate Analysis

a) Normality

Normality refers to the shape of the data distribution that corresponds to the normal distribution. To address the issue of normality of the variables in this study, the more liberal interpretation of violations of normality using values over ± 1.0 as proposed by Meyers, Gamst & Guarino, (2006) was adopted. Only two variables under the Benefits of Exercise (Pros) construct were deemed non-normality as all of the other variables in this study have fulfilled the conditions of acceptable normality since the values for both skewness and kurtosis are ranged between the acceptable values between +1 to -1 for all the variables. The two variables, have values ranged from -1.096 to 1.777 which were above the cut off value of ± 1 for both skewness and kurtosis and hence indicating that the statistical results of these two variables may

become biased or distorted (Hair et al., 1998; Hair, Black, Babin, Anderson, & Tatham, 2006; Meyers et al., 2006) and therefore need to be transformed.

In order to remediate the normality violation of the two variables, data transformation was conducted. As data transformation can cause difficulty in the interpretation, therefore in this study all the variables of the same Benefits of Exercise (Pros) construct were also subjected to similar data transformation to facilitate data interpretation process (Field, 2005). The variables were transformed by squaring the values of the variables involved. The transformation of the variables has successful reduced the skewness and kurtosis values considerably.

Table 4.1 shows the descriptive statistics for all the variables (including all the transformed Benefits of Exercise (Pros) variables which have been transformed by squaring the variables) in this study.

Table 4.1

Descriptive Statistics for all variables (N=754)

Items	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Physical Activity Level (PAL)	0.00	119.00	38.81	23.04	0.59	0.14
Self-Efficacy (SE)	4.00	19.50	10.84	2.81	-0.06	-0.35
SE1	1.00	5.00	2.73	0.87	-0.09	-0.42
SE2	1.00	5.00	2.68	0.79	-0.05	-0.35
SE3	1.00	5.00	2.52	0.89	0.12	-0.58
SE4	1.00	5.00	2.91	0.93	-0.03	-0.45

Table 4.1, continued.

Items	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Benefits of Exercise (Pros**)**	5.25	100.00	71.34	20.14	-0.53	-0.19
sqDBP1	1.00	25.00	18.49	5.69	-0.53	-0.41
sqDBP2	1.00	25.00	18.44	5.64	-0.58	-0.27
sqDBP3	1.00	25.00	17.47	5.87	-0.32	-0.71
sqDBP4	1.00	25.00	16.94	5.97	-0.31	-0.70
Costs of Exercise (Cons**)**	3.00	15.00	7.48	2.24	0.28	-0.08
DBC1	1.00	5.00	2.51	0.81	0.22	-0.05
DBC2	1.00	5.00	2.63	0.84	0.16	-0.13
DBC3	1.00	5.00	2.34	0.93	0.44	-0.35
Processes of Change (Cognitive)	5.67	20.00	13.90	2.45	-0.26	0.19
CR	1.00	5.00	3.24	0.78	-0.10	0.06
DR	1.00	5.00	3.18	0.77	-0.12	0.06
ER	1.00	5.00	3.47	0.84	-0.27	-0.30
SR	1.00	5.00	3.68	0.77	-0.35	0.02
SoL	1.00	5.00	3.52	0.76	-0.29	0.17
Processes of Change (Behavioural)	6.00	20.00	14.26	2.58	-0.30	-0.16
CC	1.00	5.00	3.61	0.75	-0.32	0.09
HR	1.00	5.00	3.31	0.94	-0.34	-0.39
RM	1.00	5.00	3.54	0.78	-0.24	-0.12
SL	1.33	5.00	3.80	0.76	-0.40	-0.20
SC	1.00	5.00	2.61	0.96	0.20	-0.61
Phy. Self-Perception (sport)	3.00	12.00	7.18	1.67	0.06	-0.12
SPT1	1.00	4.00	2.51	0.73	0.09	-0.45
SPT2	1.00	4.00	2.26	0.69	0.13	-0.38
SPT3	1.00	4.00	2.41	0.67	0.10	-0.12

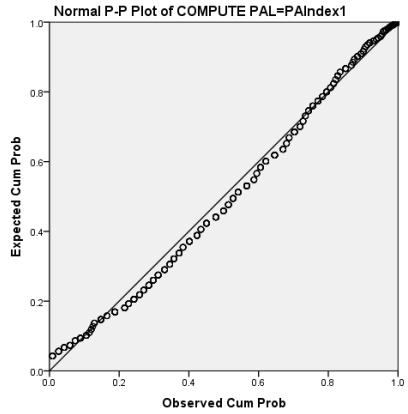
Table 4.1, continued.

Items	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Phy. Self-Perception (conditioning)	3.00	12.00	7.42	1.53	0.11	0.09
CDN1	1.00	4.00	2.50	0.64	0.15	-0.19
CDN2	1.00	4.00	2.41	0.67	0.09	-0.16
CDN3	1.00	4.00	2.51	0.63	0.11	-0.30
Phy. Self-Perception (appearance)	3.00	11.50	6.96	1.49	-0.02	-0.09
APP1	1.00	4.00	2.41	0.65	0.00	-0.30
APP2	1.00	4.00	2.17	0.63	0.19	-0.18
APP3	1.00	4.00	2.37	0.66	0.06	-0.17
Phy. Self-Perception (strength)	3.00	12.00	7.37	1.70	0.16	-0.18
STRG1	1.00	4.00	2.54	0.82	0.14	-0.57
STRG2	1.00	4.00	2.44	0.66	0.28	-0.23
STRG3	1.00	4.00	2.39	0.56	0.15	-0.01

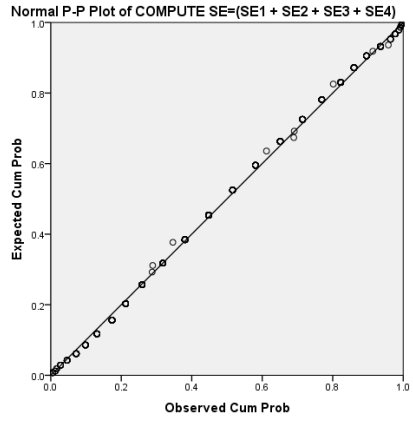
The test for normality is further confirmed using graphical approach. In addition to examine the normality through statistical method, Hair et al. (1998) indicates that the simplest diagnostic test for normality is through visual inspection of the histogram of the observed data in comparison with the distribution of a normal distribution. However, a more reliable approach is to use the normal probability plot, which compares the cumulative distribution of the actual data values with the cumulative distribution of a normal distribution. A normal distribution produces a straight diagonal line, and the plotted data values are compared with this diagonal. Normality is assumed if the plotted data values follow closely along the diagonal.

Figure 4.1.1 shows the normality plots for the variables Physical Activity (PAL), Self-Efficacy (SE), Benefits of Exercise (sqPros), Costs of Exercise (Cons), Cognitive

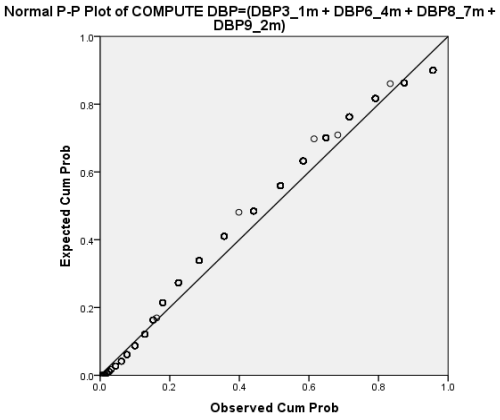
processes of Change (C_POC), Behavioural Processes of Change (B_POC) and the Physical Self-Perception Profile (PSP).



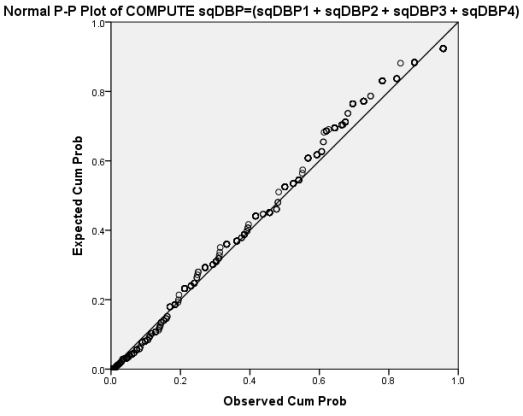
Physical Acitivity Level (PAL)



Self-Efficacy (SE)

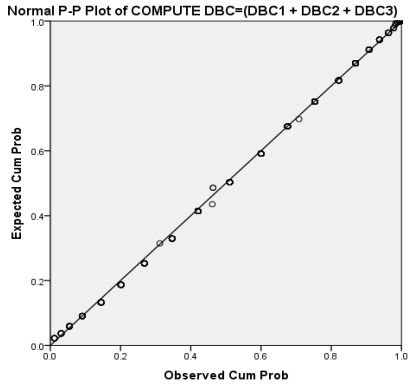


Benefits of Exercise (Pros)

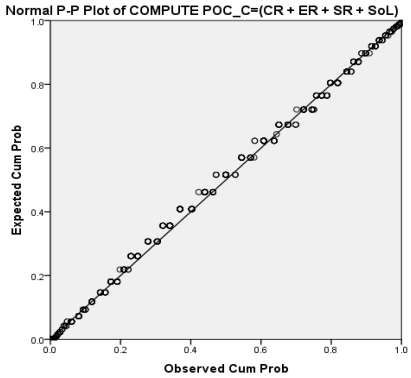


Benefits of Exercise (sqPros) – after transformation

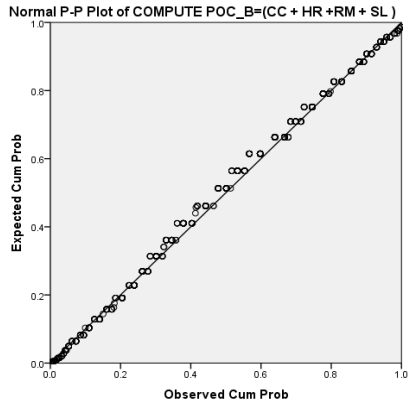
Figure 4.1.1: Normality plots for Physical Activity (PAL), Self-Efficacy (SE), Benefits of Exercise (Pros), Costs of Exercise (Cons), Cognitive Processes of Change (C_POC), Behavioural Processes of Change (B_POC) and the Physical Self-Perception Profile (PSP).



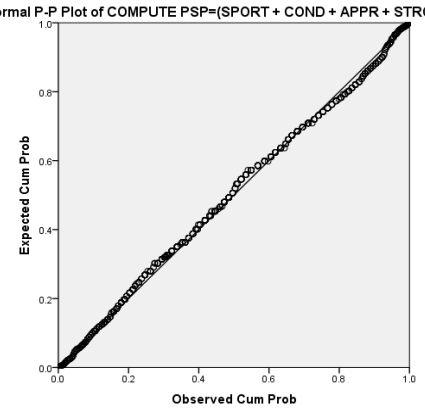
Costs of Exercise (Cons)



Cognitive Processes of Change (C-POC)



Behavioural Processes of Change (B-POC)



Physical Self-Perception (PSP)

Figure 4.1.1: Normality plots of the variables (Continued)

As shown in Figure 4.1.1 (left-side section), the graphical analyses revealed that only the normality P-P plot for Pros shown deviation from the diagonal whereby the plotted data values arched above the diagonal indicating a positively skewed distribution. Conversely, after all the variables for Benefits of Exercise (Pros) have been transformed by squaring the variables, the skewness and kurtosis values have successful been reduced considerably to within the acceptable limits, between +1 and -1 (see Figure 4.1.1 right-side section, the dots are closer now to the diagonal line, and hence normality can be assumed).

b) Linearity

Another important assumption in multivariate analysis based on correlational measures of association is linearity, which is to assume that variables in the analysis are related to each other in a linear manner. As correlation represents only the linear association between the variables, nonlinear effects will not be represented in the correlation and this result in an underestimation of the actual strength of the relationship (Hair, Black, Babin, & Anderson, 2010). Based on this assumption, hence linearity can be examined by statistical method through the computation of the Pearson product-moment correlation coefficients.

The relationships between all the variables except for Costs of Exercise (Cons) indicated that the relationships were considered linear because the probabilities associated with the correlation coefficients were statistically significant at $p < .05$ (see Table 4.2).

Table 4.2

Pearson product-moment correlation coefficients.

		2	3	4	5	6	7
1	PAL	.304**	.326**	-.110**	.319**	.364**	.247**
2	SE	-	.388**	-.025	.403**	.439**	.278**
3	sqPros		-	-.206**	.605**	.621**	.293**
4	Cons			-	-.110**	-.136**	-.160**
5	C_POC				-	.792**	.338**
6	B_POC					-	.343**
7	PSP						-

**. Correlation is significant at the 0.01 level (2-tailed).
Note: sqPros = after transformation by squaring of the variable

c) Homoscedasticity

Another important assumption in statistical techniques in both univariate and multivariate analysis is requirement for homoscedasticity, which refers to the relationship between the variables. Homoscedasticity refers to the assumption that dependent variables demonstrate equal levels of variance across the range of predictor variables (Hair et al., 2010). The violation of this assumption will underestimate the measure of correlation between the related variables and hence resulting in a degradation of analysis (de Vaus, 2002).

According to Tabachnick and Fidell (2007), homoscedasticity is related to the assumption of normality because when the assumptions of multivariate normality are met, the relationships between variables are homoscedastic. Tabachnick and Fidell (2007) further point out that, heteroscedasticity, which is the failure of homoscedasticity, is not fatal to analysis of ungrouped data. The linear relationship between variables is captured by the analysis, but there is even more predictivity if the

heteroscedasticity is accounted for. If it is not, the analysis is weakened, but not invalidated.

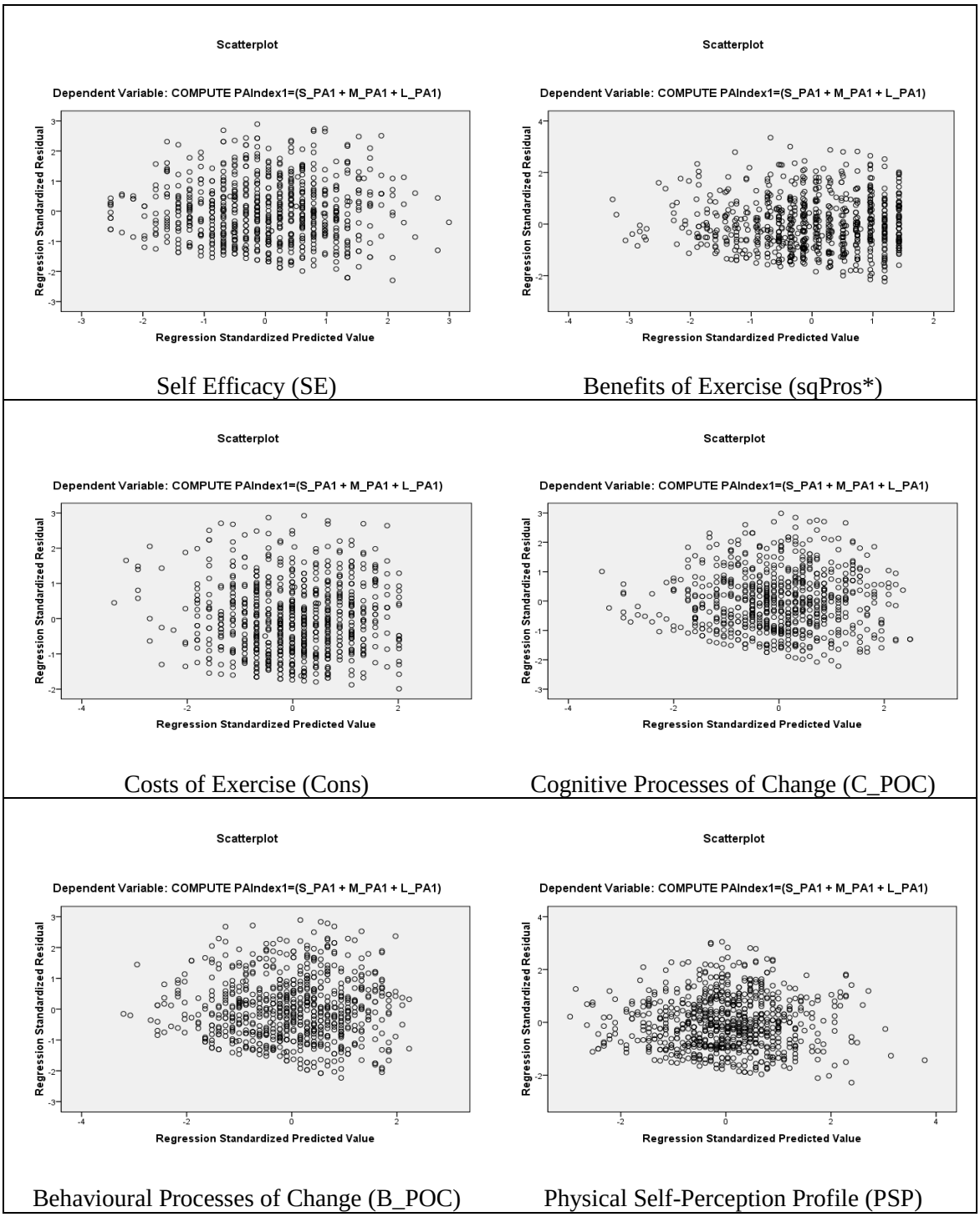


Figure 4.1.2: Residuals scatterplots for various independent variables (Self-Efficacy, Benefits of Exercise, Costs of Exercise, Cognitive Processes of Change, Behavioural Processes of Change and the Physical Self-Perception Profile) with the dependent variable (Physical Activity Level).
Note: sqPros* = after transformation by squaring of the variable

Hence, as recommended by Hair et al. (2006) the test of homoscedasticity was also examined graphically. The residuals scatterplot can be used to detect any statistical assumption violations and provides information on the homoscedasticity of the related variables of interest. Figure 4.1.2 illustrated the residuals scatterplots between the various independent variables with the dependent variable (Physical activity). Assessment of the residual scatterplots output, indicated that the dots are spread out across the graph forming a rectangular shape (although not perfectly). The plots show no obvious pattern, thereby indicating the condition of homoscedasticity has been met.

4.3 Reliability of the Scales Used in the Study

Table 4.3 reports the reliability of the variables in this study. The alpha coefficients for the scales ranged from .66 to .89. The reliability tests indicated that the items were internally consistent for self-efficacy (SE), Decisional Balance (DB), and the two Processes of Change, specifically Cognitive Processes of Change (POC-C) and Behavioural Process of change (POC-B) since the items for the related constructs have alpha values above the .70 acceptable thresholds and hence are accepted to be reliable (Kline, 2005).

However, one of the four subdimensions of the Physical Self Perception (PSP) construct, specifically the PSP-Appearance subdimension has an alpha coefficient of .66 which was below the .70 acceptable thresholds. The subdimension PSP-Appearance was however retained in this study since it was just marginally away from the acceptable value of .70. The other subdimensions of Physical Self Perception (PSP) were all above the acceptable value of .70. The alpha values for these three variables were PSP-Conditioning (.70), PSP-Strength (.76) and PSP-Sport (.72).

Table 4.3

Reliability Statistics (Cronbach's alpha)

Constructs	No. of Items	Cronbach's Alpha
Self-Efficacy	4	.82
sqDB-Pros	4	.89
DB-Cons	3	.83
POC-Cognitive	4	.78
POC-Behavioural	4	.80
PSP-Sport	3	.72
PSP-Conditioning	3	.70
PSP-Appearance	3	.66
PSP-Strength	3	.76

4.4 Demographic Profiles

The participants in this study are teacher trainees who are currently pursuing a five and a half year full-time Bachelor in Education Programme (Program Ijazah Sarjana Muda Perguruan - PISMP) in the various teacher education institutes in Malaysia. The demographic backgrounds of participants are summarized in Table 4.4.

The majority of the teacher trainees who participated in this study were female (59.4%), while male constituted 40.6%. In term of their ethnicity, three quarter (75.3%) of the participants was Malay ethnic group, followed by Chinese (14.3%) and the remaining 10.4% from the Indian ethnic group.

Table 4.4

Demographic profile of participants (N=754)

Demographic Characteristics		Frequency	(%)
Gender	Male	306	40.6
	Female	448	59.4
Ethnicity	Malay	568	75.3
	Chinese	108	14.3
	Indian	78	10.4
Age (years)	≤ 19	186	24.7
	20	308	40.8
	21	191	25.3
	≥ 22	69	9.2
Educational background	SPM	748	99.2
	Others (STPM, etc.)	6	0.8
Previous Sport Participation Experience	Sport House	217	28.8
	School	195	25.9
	District	196	26.0
	State	72	9.5
	National	10	1.3
	Not declared	48	6.4
	Not active	16	2.1
Subject Majoring	PE Major	244	32.4
	Non PE Major	510	67.6

The age of the participants ranged between 17 to 25 years old and the majority of the teacher trainees were under the age of 21 years old (65.5%) with the rest (34.5%) above 21 years old. In relation to their educational background**,** almost all of the participants were SPM (equivalent to O-Level General Certificate of Education) holders

(99.2%). The rest of the participants (0.8%) possessed other qualifications (e.g. STPM or A-Level General Certificate of Education).

As shown in Table 4.4, five levels of past sport participation experiences were measured and the majority of them reported to have participated at school's sport house level (28.8%). These were followed by participants who reported to have experience**s** in representing at the school and/or district level (25.9% and 26% respectively), representing the state level (9.5%) and national level (1.3%) with the remainder 8.5% with no past sport experience**s** or not declaring their past sport participation level.

Among the participants, 32.4% or 244 teacher trainees were majoring in Physical Education programme and the other 67.6% or 510 teacher trainees were majoring in non-Physical Education programmes. These non-Physical Education programme trainees majored in subject such as English Language, Bahasa Malaysia, Science and Mathematics, and also in Music. However all trainees are required to take Physical Education classes to fulfil the requirements for the degree of Bachelor in Education Programme (Program Ijazah Sarjana Muda Perguruan - PISMP)

4.5 Research Question 1

What are the physical activity levels of the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

a) Participants' Physical Activity Participation

The physical activity of the participants was measured using the Godin's Leisure Time Exercise Questionnaire (LTEQ). Data regarding participants' physical activity participation are summarized in Table 4.5.1 below.

Table 4.5.1

Physical Activity Participation Level of the Participants

Physical Activity level (PAL)	No. of participants	Percent
Frequent (active)	254	33.7
Sometimes (moderately active)	425	56.4
Seldom/Never (non-active)	75	9.9
Total	754	100.0

With regard to physical activity level, there was slightly over a third (33.7%, *n* = 254) of the participants indicated that they participated in sweat-inducing physical activity on a regular basis, while more than half (56.4%, *n* = 425) of the participants indicated that they sometimes participated in sweat-inducing physical activity. Another 9.3% (*n* = 75) of the participants in this study indicated that they were rarely or had never been active in sweat-inducing physical activity.

To facilitate comparison, participants from the above groups were renamed. Participants from the group who frequently participated in sweat-inducing physical activity were reclassified as physically active group. The second group who reported that they sometimes participated in sweat-inducing physical activity was reclassified as moderately active group while the third group who reported that they were rarely or had never been active in sweat-inducing physical activity was named as non-active group.

The participants' physical activity status was also verified using the weekly leisure-time exercise score (Godin & Shephard, 1985). As suggested by Godin and Shephard, the weekly leisure time exercise score is determined by multiplying the frequencies for strenuous, moderate and light exercises with an arbitrary unit of nine,

five, and three METS respectively and then summing up the products of these three separate components into a composite score.

The mean weekly leisure-time exercise score of the active group was 52.80 (*SD* = 23.09) METs while the mean score for the moderately active group was 33.93 (*SD* = 18.93) and the non-active group was 19.08 (*SD* = 17.96) METs. On this measure, the one way ANOVA test as shown in Table 4.5.2 revealed that there were significant differences among the three groups of participants; F (2,751) = 107.65; $p < 0.001$.

Table 4.5.2

ANOVA Comparison of Weekly Leisure-Time Exercise Scores among the three different Physical Activity Levels (PAL)

Weekly Leisure-Time Exercise Scores	*SS*	*df*	*MS*	*F*	*Sig.*
Between Groups	89034.80	2	44517.40	107.65	.000
Within Groups	310571.83	751	413.54		
Total	399606.63	753			

The Levene's Test for equality of variances indicated heterogeneity (unequal) variances among the three different Physical Activity Levels of the participants, F *(2,751)* = 6.69, p = .001. Hence, the Games-Howell post hoc multiple comparisons test was employed to determine the source of differences among the three different physical activity groups since is an appropriate test when heterogeneity of variances is present (Field, 2009; Howell, 2007; Levy & Cardinal, 2006).

As illustrated in Table 4.5.3, the participants from the three different physical activity levels were significantly different from one another. The participants who were classified as active group displayed a significantly higher weekly leisure-time exercise

score than participants in the moderately active group, and with the non-active group with a mean difference of 18.87 METs and 33.72 METs respectively. The moderately active group also exhibited a significantly higher weekly leisure-time exercise score than the non-active group with a mean difference of 14.85 METs.

Table 4.5.3

Games-Howell Post Hoc Multiple Comparisons Results of the Weekly Leisure-Time Exercise Mean Scores (PAL) among the three different Physical Activity Levels

(I) PAL	(J) PAL	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Active	Moderate	18.87*	1.71	0.00	14.84	22.90
Active	Non-Active	33.72*	2.53	0.00	27.74	39.71
Moderate	Non-Active	14.85*	2.27	0.00	9.46	20.25

*. The mean difference is significant at the 0.05 level.

b) Participants' Physical Activity Participation in relation to their Gender

Data regarding participants' physical activity participation in relation to their gender are summarized in Table 4.5.4. As expected, the male participants (teacher trainees) within the physically active group reported that they engaged more frequently in physical activity. 52.6% of the male indicated that they frequently engaged in physical activity while only 20.8% of the female indicated that they often engaged in physical activity. However, more of the female participants (65.2%) indicated that they were moderately active in physical activity (sometimes) compared to 43.5% of male teacher trainees who reported that they sometimes engaged in physical activity.

More female teacher trainees (14.1%) also reported that they seldom or never participated in physical activity as compared with their male counterpart (3.9%).

Table 4.5.4

Physical Activity Participation Level Comparison by Gender

Physical Activity level (PAL)	Gender		
	Male (%)	Female (%)	Total (%)
Active Group	161 (52.6)	93 (20.8)	254 (33.7)
Moderately Active Group	133 (43.5)	292 (65.2)	425 (56.4)
Non-Active Group	12 (3.9)	63 (14.1)	75 (9.9)
Total	306 (100.0)	448 (100.0)	754 (100.0)

Consequently the chi-square (χ^2) test revealed a significant difference between the female and male teacher trainees in their physical activity participation level (χ^2 = 88.78, df = 2, N = 754, p < .001).

The participants' weekly leisure-time exercise score was also evaluated to compare the differences between the genders. The male participants' mean weekly leisure-time exercise score was 47.27 (SD = 24.31) METs, which was higher than the mean score for the female participants of 33.04 (SD = 20.20) METs.

Table 4.5.5 summarizes the *t*-Test for the Weekly Leisure-Time Exercise Scores between the genders. The Levene's test of equal variances indicated a significant difference, F = 8.92, p < .05 and hence indicated a violation of homogeneity of variance. Consequently, the separate variance t-test (equal variances not assumed) was reported instead. The independent t-test results in Table 4.5.5 showed that there was a significant difference between the gender of participants (t (752) = 8.44; p < 0.01) in

their mean weekly leisure-time exercise score. The results indicated that the male participants have a higher weekly leisure-time exercise mean scores compared to the female participants.

Table 4.5.5

Independent Samples t-Test Comparison of Weekly Leisure-Time Exercise Scores by Gender

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	47.27	24.31	8.44	.00	.65
Female	448	33.04	20.20			

c) Participants' Physical Activity Participation in relation to their Age-Groups

In term of age, the participants had been categorized into four age-groups, specifically 19 years old and below, 20 years old, 21 years old, and 22 years old and above. Overall, there were only marginal differences in percentage among the four categories of age groups in the pattern of physical activity level between the frequently active group (frequent) and the moderately active group (sometimes).

Table 4.6.1 summarizes the data regarding participants' physical activity participation in term of their age groups. As shown in Table 4.6.1, the percentage of participants in the physically active category ranged from 30.4% to 35.6%, while for the moderately active group, the percentage of participants ranged from 53.4% to 58.1%. This illustrates that more than half (56.4%) of the participants were in the moderately active category. However, for the non-active group of participants, the percentage indicates a steady increment across the age groups. For the non-active group (participants who have indicated that they seldom or never participated in physical

activity), only 7.0% of the participants belonged to the 19 years old and below age group. The percentage increased to 9.7% and 11.0% for the 20 years old age-group and the 21 years old age-group respectively. The percentage of the non-active participants in the 22 years old and above age group increased to more than double (15.9%) compared to participants in the 19 years old and below age group suggesting that more participants in the older age group were in the non-active category compared to the younger age groups. However, the Chi-square (χ^2) test revealed that there was no significant difference in the four age groups in their physical activity participation level among the participants ($\chi^2 = 5.60$, $df = 6$, $N = 754$, and $p > .05$).

Table 4.6.1

Physical Activity Level Comparison by Age Group

Physical Activity Level (PAL)	Age-Group (years old)				
	≤ 19 (%)	20 (%)	21 (%)	≥22 (%)	Total (%)
Active Group	65 (34.9)	100 (32.5)	68 (35.6)	21 (30.4)	254 (33.7)
Moderately Active Group	108 (58.1)	178 (57.8)	102 (53.4)	37 (53.6)	425 (56.4)
Non-Active Group	13 (7.0)	30 (9.7)	21 (11.0)	11 (15.9)	75 (9.9)
Total	186(100.0)	308(100.0)	191(100.0)	69(100.0)	754(100.0)

The participants' physical activity status of the four age groups when verified using their weekly leisure-time exercise mean scores for the age-groups exhibit a decreasing inclination as the age group gets older. The weekly leisure-time exercise mean score for the 19 years old and below age-group participants was 43.41 (*SD* = 23.34) METs while the mean score for the 20 years old age-group was 39.63 (*SD* = 22.41) METs. The mean score got smaller to 37.19 (*SD* = 23.47) METs for the 21 years

old group and it got smaller still to 27.26 (*SD* = 19.62) METs for the 22 years old and above group.

Table 4.6.2

ANOVA Comparison of the Weekly Physical Leisure-Time Exercise Scores among the different Age-Groups

Weekly Physical Leisure-Time Exercise Scores	*SS*	*df*	*MS*	*F*	*Sig.*
Between Groups	13850.31	3	4616.77	8.98	.00
Within Groups	385756.32	750	514.34		
Total	399606.63	753			

The results of the Levene's Test for equality of variances indicated homogeneity of variances among the four age-groups, F (3,750) = .34, $p > .05$. The one way ANOVA test results as shown in Table 4.6.2 revealed that there were significant differences in their weekly leisure-time exercise scores among the four age-groups of participants, F (3,750) = 8.98; $p < .01$.

Consequently, the Scheffe post hoc multiple comparisons test, which is appropriate for groups with homogeneity in variances was employed to determine the differences among the groups. As indicated in Table 4.6.3, the post hoc multiple comparisons results revealed that the 22 years old and above group was significantly different from the other three age-groups in their weekly leisure-time exercise mean scores, namely; the 19 years old and below age-group (mean difference = -16.15 METs), the 20 years old age-group (mean difference = -12.37 METs), and also the 21 years old group (mean difference = -9.93 METs). However, there was no significantly difference between the other three age-groups namely, the 21 years old age-group, the 20 years old

age-group, and the 19 years old and below age-group in their mean weekly leisure-time exercise score.

Table 4.6.3

Scheffe Multiple Comparisons of the Weekly Leisure-Time Exercise Mean Scores (PAL) among the four Age-Groups

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
≤ 19	20	3.79	2.11	0.36	-2.11	9.69
≤ 19	21	6.22	2.34	0.07	-0.33	12.77
≤ 19	22+	16.15*	3.20	0.00	7.20	25.11
20	21	2.43	2.09	0.72	-3.42	8.29
20	22+	12.37*	3.02	0.00	3.90	20.83
21	22+	9.93*	3.19	0.02	1.01	18.86

*. The mean difference is significant at the 0.05 level.

d) Participants' Physical Activity Participation in relation to their Ethnicity

Data regarding participants' physical activity participation in term of their ethnicity are summarized in Table 4.7.1. With regard to ethnicity, the majority of the participants who reported that they frequently participated in physical activity came from the Malay participants (82.3%), followed by Indian (10.2%) and the Chinese (7.5%). For those participants who reported they sometimes engaged in physical activity, 73.9% were Malay, 15.1% were Chinese and 11.1% were from the Indian participants. The Chinese (23.1%) were the highest in the category who reported that they rarely or never participated in physical activity. This was followed by Malay (7.9%) and the Indian (6.4%).

Table 4.7.1

Physical Activity Level Comparison by Ethnicity

Physical Activity Level (PAL)	Ethnicity			
	Malay	Chinese	Indian	Total
Frequent	209 (36.8)	19 (17.6)	26 (33.3)	254 (33.7)
Sometimes	314 (55.3)	64 (59.3)	47 (60.3)	425 (56.4)
Seldom / Never	45 (7.9)	25 (23.1)	5 (6.4)	75 (9.9)
Total	568 (100.0)	108 (100.0)	78 (100.0)	754 (100.0)

Within the Malay participants, 36.8% reported to have engaged frequently in physical activity, followed by 55.3% who sometimes engaged in physical activity and 7.9% who seldom or rarely took part in physical activity. For the Chinese participants, only 17.6% indicated that they frequently involved in physical activity while 59.3% said that they sometimes engaged in physical activity and another 23.1% indicated that they rarely participated in physical activity. As for the Indian, 33.3% indicated that they frequently exercised, followed by 60.3% indicated that they sometimes exercised while 6.4% reported that they rarely or never took part in physical activity. Subsequently, the chi-square test revealed a significant difference among the three ethnic groups in their physical activity participation level ($\chi^2 = 32.67$, $df = 4$, $N = 754$, $p < .001$).

The physical activity levels of the ethnic groups were verified using their weekly leisure-time exercise score. The mean weekly leisure-time exercise score for the Malay participants was 41.36 (*SD* = 22.87) METs while the mean score for the Indian participants was 38.77 (SD = 24.79) METs and the Chinese participants was 25.47 (*SD* = 17.47) METs.

Table 4.7.2

ANOVA Comparison of Weekly Physical Leisure-Time Exercise Scores among the different Ethnicity Groups

Weekly Physical Leisure-Time Exercise	*SS*	*df*	*MS*	*F*	*Sig.*
Between Groups	22893.71	2	11446.85	22.82	.00
Within Groups	376712.93	751	501.62		
Total	399606.63	753			

The one way ANOVA test as shown in Table 4.7.2 confirmed that there were significant differences among the three different ethnic groups (F (2,751) = 22.82; $p <$ 0.01) in terms of their mean weekly physical leisure-time exercise scores. As the Levene's test for equality of variances indicated the assumption of homogeneity of variance was violated among the three different ethnicity groups of the participants, F (2,751) = 5.01, $p <$. 05), therefore, the Games-Howell follow-up post hoc multiple comparisons test (Howell, 2007) was used instead.

The post hoc Games-Howell multiple comparisons results as shown in Table 4.7.3 highlighted that the Malay participants was significantly different from the Chinese participants in their mean weekly leisure-time exercise score (mean difference = 15.88 METs) but was not significantly different from the Indian participants (mean difference = 2.59 METs) in their mean weekly leisure-time exercise score. The Indian participants were also significantly different from the Chinese participants (mean difference = 13.30 METs) in their mean weekly leisure-time exercise score.

Table 4.7.3

Games-Howell Post Hoc Multiple Comparisons of the Weekly Leisure-Time Exercise Mean Scores among the different Ethnicity Groups

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	15.88*	1.94	0.00	11.31	20.46
Malay	Indian	2.59	2.97	0.66	-4.48	9.65
Chinese	Indian	-13.30*	3.27	0.00	-21.06	-5.54

*. The mean difference is significant at the 0.05 level.

4.6 Research Question 2

What are the stages of exercise change of the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

a) The Stages of Exercise of the Participants

The stages of exercise of the participants were measured using the Stage of Change Questionnaire (SCQ) by Marcus, et al. (1992). Table 4.8 shows the results of the frequency analysis of the stages of exercise distribution pattern of the participants (teacher trainees) involved in this study.

Overall, about 36.6% (n = 276) of the participants reported had actively participated in physical activity (action/maintenance), while 49.3% (n = 372) were irregularly active (preparation) and another 14.0% (n = 106) of the participants were reported to be in an inactive stage (pre-contemplation or contemplation).

Table 4.8

Stages of Exercise Change Distribution

Stages	*f*	(%)
Pre-Contemplation	13	1.7
Contemplation	93	12.3
Preparation	372	49.3
Action	76	10.1
Maintenance	200	26.5
Total	754	100.0

To facilitate further statistical analysis, the stages of exercise change was reclassified by collapsing the five stages into three categories specifically the pre-contemplation/ contemplation (not physically active group), preparation (irregularly active group) and followed by action/maintenance (regularly active group).

b) Prevalence of the Stages of Exercise of the Participants in relation to Gender

Table 4.9.1 illustrates the stages of exercise change distribution in terms of gender of the sample. With reference to Table 4.9.1, it is shown that more male participants (55.2%) were in the action/maintenance category compared to the female participants (23.9%). However, more female participants reported to be in the preparation stage (49.3%) and pre-contemplation/ contemplation (19.4%) compared with their male counterpart with preparation (38.6%) and pre-contemplation/ contemplation (6.2%).

Table 4.9.1

Distribution of the Stages of Exercise Change by Gender

Variable	Stages of Exercise Change *n* (%)			
	Pre-Con / Contemplation	Preparation	Action / Maintenance	Total
Gender				
Male	19 (6.2)	118 (38.6)	169 (55.2)	306 (100.0)
Female	87(19.4)	254(56.7)	107(23.9)	448 (100.0)

The Stage of Exercise consequently turned out to be gender related. Chi-square (χ^2) test revealed a significant difference between the female and male participants (teacher trainees) in terms of their Stages of Exercise Change (χ^2 = 83.49, *df* = 2, *N* = 754, $p < .001$).

c) Prevalence of the Stages of Exercise of the Participants in relation to Age-Groups

Table 4.9.2 illustrates the stages of exercise change distribution in terms of age groups of the sample. As shown in Table 4.9.2, in terms of age groups, more participants from the youngest age group were in the action/maintenance stage compared to participants from the older age categories. On the other hand, more participants from the older age group (24.6%) were in the pre-contemplation/ contemplation stage compared to the youngest age group (12.9%). However chi-square test results showed that there was no significant difference among the four age groups of the participants in their stages of exercise change *(χ^2 = 10.91, df = 6, N =* 754, $p = .091$*).*

Table 4.9.2

Distribution of the Stages of Exercise Change by Age-Groups

Variables	Stages of Exercise Change *N* (%)			
	Pre-Con / Contemplation	Preparation	Action / Maintenance	Total
Age-Groups				
≤ 19 yrs. old	24 (12.9)	90 (48.4)	72 (38.7)	186 (100.0)
20 yrs. old	36 (5.2)	161 (52.3)	111 (36.0)	308 (100.0)
21 yrs. old	29 (15.2)	87 (45.5)	75 (39.3)	191 (100.0)
≥ 22 yrs. old	17 (24.6)	34 (49.3)	18 (26.1)	69 (100.0)

d) Prevalence of the Stages of Exercise of the Participants in relation to Ethnicity

In addition, the prevalence of the stages of exercise among different ethnicity was also compared to determine the distribution pattern of the participants. Table 4.9.3 shows the stages of exercise change distribution in terms of ethnicity of the sample.

Table 4.9.3

Distribution of the Stages of Exercise Change by Ethnicity

Variables	Stages of Exercise Change			
	Pre-Con / Contemplation	Preparation	Action / Maintenance	Total
Ethnicity				
Malay	65 (11.4)	287 (50.5)	216 (38.0)	568 (100.0)
Chinese	28 (25.9)	51 (47.2)	29 (26.9)	108 (100.0)
Indian	13 (16.7)	34 (43.6)	31 (39.7)	78 (100.0)

Overall, the Indian participants revealed that they were the most physically active group with 39.7% reported to be in the action/maintenance stage, followed by the Malay participants (38.0%) while the Chinese (26.9%) were the least in the action/maintenance stage. On the other hand, the Chinese were highest in the pre-contemplation/ contemplation (non-active) stage followed by the Indian (16.7%) and the Malay (11.4%). Subsequently the chi square statistic indicated that there was significant difference among the three ethnic groups in their stages of exercise change distribution ($\chi^2 = 18.07$, $df = 4$, $N = 754$, $p = .001$).

4.7 Research Question 3

What are the differences in psychological variables in terms of (a) self-efficacy, (b) decisional balance (c) processes of change, and (d) physical self-perception profile among the Malaysian teacher trainees in relation to the following demographic variables; gender, age and ethnicity?

a) Decisional Balance

The decisional balance is a person's relative judgment of the perceived positive (Pros) and the negative (Cons) of making a behaviour change and is believed to be an vital factor in decision-making (Nigg & Courneya, 1998). The decisional balance among the teacher trainees was measured using the Decisional Balance Questionnaire (DBQ) that was designed by Marcus, Rakowski and Rossi (Marcus et al., 1992b). In this present study, the decisional balance was analysed and interpreted separately in term of the perceived Benefits of Exercise (Pros) and the perceived Costs of Exercise (Cons).

b) Self-Efficacy

The Self-Efficacy Scale Questionnaire (SEQ) developed by Marcus, et al. (1992) measures participants' situational confidence in the ability to persist with exercising in various situations. In order to compare the self-efficacy level between the male teacher trainees and female teacher trainees, the independent sample *t*-test was conducted.

A closer look at the results as shown in Table 4.10.1 revealed that the mean self-efficacy scores for the 306 male participants was 11.58 (*SD* = 2.76) while the 448 female participants had a lower mean self-efficacy score of 10.33 (*SD* = 2.73).

Table 4.10.1

Independent Samples t-Test Comparison for Self-efficacy by Gender

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	11.58	2.76	6.16	.000	0.46
Female	448	10.33	2.73			

The Levene's test for equality of variances indicated no violation of assumption, $F = .003$, $p > .05$ and therefore the equal variance assumed *t*-statistic was used for evaluating the hypothesis of equality of means. The result from the *t*-test conducted revealed that the difference in their mean self-efficacy scores was significant, t ($df = 752$) = 6.16, $p < .05$. The computed Cohen's $d = .46$ which was in the range of a medium effect size. Hence it can be concluded that the male participants (teacher trainees) have significantly higher self-efficacy for exercise compared to the female participants.

To determine whether the teacher trainees' self-efficacy would differ between the four age-groups, one-way analysis of variance (ANOVA) was conducted. Table 4.10.2 shows the summarized result of the ANOVA test.

Levene's test for equality of variances indicated homogeneity of variances among the four age-groups, $F = .68$, $p > .05$. The mean self-efficacy scores for the four age groups were 19 years old and below group ($M = 11.6$, $SD = 2.69$), 20 years old ($M = 10.66$, $SD = 2.86$), 21 years old ($M = 11.06$, $SD = 2.78$), and the 22 years old and above group ($M = 10.84$, $SD = 2.81$). The one-way ANOVA showed F to be significant beyond the .05 level: F (3, 750) = 3.10; $p = .03$.

Table 4.10.2

ANOVA Comparison of Self-efficacy by Age-Groups

Self-efficacy	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	72.57	3	24.19	3.10	.03	.01
Within Groups	5858.93	750	7.81			
Total	5931.50	753				

Consequently, follow-up post hoc Scheffe multiple comparisons test was conducted to compare between the groups. As illustrated in the Table 4.10.3, the participants in the 19 years old and below group have significantly higher self-efficacy for exercise than participants from the 22 years old and above age-group but was not significantly different from the other two age groups, specifically the 20 years old age-group and the 21 years old age-group. However, there was no significant different in their self-efficacy between the other age-groups. Consequently, the partial eta squared generated was only .01 indicating a very small effect size.

Table 4.10.3

Scheffe Multiple Comparisons of Self-efficacy by Age-Groups

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
≤ 19	20	.50	.26	.22	-.17	1.17
≤ 19	21	.10	.29	.99	-.64	.84
≤ 19	22+	1.03*	.39	.05	.01	2.04
20	21	-.40	.26	.41	-1.06	.26
20	22+	.53	.37	.49	-.43	1.48
21	22+	.93	.39	.09	-.09	1.94

*. The mean difference is significant at the 0.05 level.

In order to investigate if there were any differences in the self-efficacy of the teacher trainees from the three ethnic groups, one-way analysis of variance (ANOVA) was computed. Table 4.10.4 summarizes the result of the ANOVA test.

Table 4.10.4

ANOVA Comparison of Self-efficacy by Ethnicity

Self-efficacy	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	97.59	2	48.79	6.28	.00	.02
Within Groups	5833.91	751	7.77			
Total	94524.45	754				

The Levene's test for equality of variances indicated homogeneity of variances among the three ethnicity groups $F = 1.59$, $p > .05$. The mean self-efficacy scores for

the three ethnic groups were Malay (*M* = 10.90, *SD* = 2.75), Chinese (*M* = 10.07, *SD* = 2.87), and the Indian (*M* = 11.48, *SD* = 2.81). The one-way ANOVA showed *F* to be significant beyond the .05 level: $F(2, 751) = 6.28$; $p < .01$.

Follow-up post hoc Scheffe multiple comparisons test (Table 4.10.5) showed that the Indian participants were significantly higher in their self-efficacy from the Chinese participants (Mean difference = 1.41) but was not significantly different from the Malay participants in their self-efficacy for exercise. The Chinese participants were also significantly lower in their self-efficacy score when compared with the Malay participants. However, the partial eta squared generated was only .02 indicating that the effect size was small.

Table 4.10.5

Scheffe Multiple Comparisons of Self-efficacy by Ethnicity

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	.83*	.29	.02	.11	1.55
Malay	Indian	-.58	.34	.23	-1.4	.25
Chinese	Indian	-1.41*	.41	.00	-2.42	-.39

*. The mean difference is significant at the 0.05 level.

In summary, the results indicated that there were statistically significant differences in the teacher trainees' self-efficacy for exercise between the gender, between the four age groups, and between the three ethnic groups. However, with the exception of gender, which has demonstrated a medium effect on the self-efficacy, the effects of age groups and ethnicity on self-efficacy has only a small effect size.

i. Perceived Benefits of Exercise (Pros)

To compare the perceived Benefits of Exercise (Pros) between the male teacher trainees and female teacher trainees, an independent *t*-Test was computed. Table 4.11.1 shows the mean and the independent *t*-Test results.

Table 4.11.1

*Independent Samples t-Test Comparison of Perceived Benefits of Exercise (*Pros*) by Gender*

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	76.77	18.20	6.28	.00	0.47
Female	448	67.62	20.57			

The Levene's test for equality of variances shows that $F = 2.62$, $p > .05$, indicating that homogeneity of variances between the two genders has been met and therefore equal variances assumed *t* test was used. The mean perceived Benefits of Exercise (Pros) scores for the male teacher trainees was 76.77 ($SD = 18.20$) whereas the mean perceived Benefits of Exercise (Pros) scores for the female group had a lower mean of 67.62 ($SD = 20.57$).

The result of the independent *t*-test indicated that there was significant difference between the two genders in term of their perceived Benefits of Exercise (Pros), t ($df = 752$) = 6.28, $p < .01$. The Cohen's d was at 0.47, which implied a medium effect size.

Subsequently, to determine whether the teacher trainees' perceived Benefits of Exercise (Pros) would differ between age-groups of the participants, one-way analysis of variance (ANOVA) was computed. Table 4.11.2 shows the mean and the ANOVA results.

Table 4.11.2

*ANOVA Comparison of Perceived Benefits of Exercise (*Pros*) by Age-Groups*

Pros	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	1457.11	3	485.70	1.20	0.31	.01
Within Groups	303918.08	750	405.22			
Total	305375.19	753				

The Levene's test for equality of variances indicated homogeneity of variances among the four age-groups, $F = .753$, $p > .05$. The mean perceived Benefits of Exercise (Pros) scores for the four age-groups were 19 years old and below group ($M = 73.06$, $SD = 21.09$), 20 years old ($M = 70.44$, $SD = 20.04$), 21 years old ($M = 72.12$, $SD = 18.86$), and the 22 years old and above group ($M = 68.54$, $SD = 21.24$).

The one-way ANOVA results showed F to be not significant beyond the .05 level: F (3, 750) = 1.20; $p = .31$. This indicated that the perceived Benefits of Exercise (Pros) scores among the four age-groups were comparable. In other words, there was no significant difference among the four age-groups in term of their perceived Benefits of Exercise (Pros) scores. Consequently, the partial eta squared generated was only .01 confirming that it was a small effect size.

Accordingly, in order to investigate if there were any differences in the mean perceived Benefits of Exercise (Pros) scores of the teacher trainees from the three ethnic groups, one-way analysis of variance (ANOVA) was computed. Table 4.11.3 summarizes the results of the ANOVA test.

Table 4.11.3

*ANOVA Comparison of Perceived Benefits of Exercise (*Pros*) by Ethnicity*

Pros	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	23036.94	2	11518.47	30.64	.00	.08
Within Groups	282338.25	751	375.95			
Total	305375.19	753				

The Levene's test for equality of variances indicated homogeneity of variances among the three ethnicity groups, $F = .398$, $p > .05$. The mean perceived Benefits of Exercise (Pros) scores for the three ethnic groups were Malay ($M = 73.55$, $SD = 19.41$), Chinese ($M = 57.82$, $SD = 20.32$), and the Indian ($M = 73.96$, $SD = 17.84$).

The one-way ANOVA revealed that F to be significant beyond the .05 level: $F(2, 751) = 30.64$; $p < .01$. Subsequently, the partial eta squared computed was .08 indicating that effect size was of medium effect. To determine specifically which groups differ significantly on their mean perceived Benefits of Exercise (Pros) scores, pair-wise comparisons were assessed with the Scheffe test. The results of the post hoc tests are presented in Table 4.11.4.

Table 4.11.4

*Scheffe multiple comparisons results of the perceived Benefits of Exercise (*Pros*) among the four age-groups*

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	15.73*	2.04	0.00	10.73	20.72
Malay	Indian	-0.41	2.34	0.98	-6.15	5.33
Chinese	Indian	-16.13*	2.88	0.00	-23.20	-9.07

*. The mean difference is significant at the 0.05 level.

The results showed that the Chinese participants were significantly different from the Malay (mean difference = -.3.93) and Indian (mean difference = -4.03) participants in their perceived Benefits of Exercise (Pros). However, there was no significantly difference between the Malays and the Indians (mean difference = -.10) participants in their perceived Benefits of Exercise (Pros).

In summary, there are statistically significant differences in the teacher trainees' perceived Benefits of Exercise (Pros) between the two genders and among the three ethnic groups. However, no statistically significant difference was detected for the teacher trainees' perceived Benefits of Exercise (Pros) in relation to their age groups.

ii. Perceived Costs of Exercise (Cons**)**

An independent *t*-Test was computed to compare the Perceived Costs of Exercise (Cons) between the male teacher trainees and female teacher trainees. Table 4.12.1 shows the mean and the independent *t*-Test results.

Table 4.12.1

*Independent Samples t-Test Comparison of Perceived Costs of Exercise (*Cons*) by Gender*

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306.00	7.44	2.41	-.44	.66	.03
Female	448.00	7.51	2.11			

The results of the Levene's test for equality of variances showed a statistically significant difference, $F = 8.61$, $p < .05$, indicating unequal variances between the two genders and therefore required the use of a separate variance *t*-test (equal variance not assumed). The mean Perceived Costs of Exercise (Cons) scores for the male teacher trainees were 7.43 ($SD = 2.41$) while the mean female group disclosed a higher mean of 7.51 ($SD = 2.11$) for the Perceived Costs of Exercise (Cons) scores.

The result of the independent *t*-Test indicated that there was no significant difference between the two genders in term of their perceived Costs of Exercise (Cons), t ($df = 596$) = -.44, $p > .05$. Cohen's $d = .03$, which indicated a very small effect size.

To ascertain whether the teacher trainees' perceived Costs of Exercise (Cons) would differ among age-groups of the participants, one-way analysis of variance (ANOVA) was computed. Table 4.12.2 provides a summary of the ANOVA results.

Table 4.12.2

*ANOVA Comparison of Perceived Costs of Exercise (*Cons*) by Age-Groups*

Cons	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	17.37	3.00	5.79	1.16	0.32	.01
Within Groups	3747.77	750.00	5.00			
Total	3765.15	753.00				

The Levene's test for equality of variances showed homogeneity of variances among the four age-groups F = .97, $p > .05$. The mean perceived Costs of Exercise (Cons) scores for the four age groups were as follow; 19 years old and below group (M = 7.62, SD = 2.30), 20 years old (M = 7.30, SD = 2.23), 21 years old (M = 7.59, SD = 2.60), and the 22 years old and above group (M = 7.60, SD = 1.99). The one-way ANOVA showed F to be not significant beyond the .05 level: F (3, 750) = 1.16; p = .32. As a result, the partial eta squared generated was only .01 confirming that it has a very small effect size.

A One-way analysis of variance (ANOVA) was also computed to investigate if there were any differences in the perceived Costs of Exercise (Cons) of the teacher trainees from the three ethnic groups. Table 4.12.3 summed up the results of the ANOVA test.

The Levene's test for equality of variances output was not statistically significant $F = 1.56$, $p > .05$ indicating homogeneity of variances among the three ethnicity groups. The perceived Costs of Exercise (Cons) mean score for the three ethnic groups revealed that the Chinese teacher trainees have the highest mean score ($M = 8.07$, $SD = 2.05$). This was followed by the Indian ethnic group ($M = 7.84$, $SD = 2.35$) with the Malay ethnic group having the lowest mean score for perceived costs of exercise or Cons ($M = 7.32$, $SD = 2.23$).

Table 4.12.3

*ANOVA Comparison of Perceived Costs of Exercise (*Cons*) by Ethnicity*

Cons	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	62.33	2	31.16	6.32	.00	.02
Within Groups	3702.82	751	4.93			
Total	3765.15	753				

The one-way ANOVA showed that the *F* value to be significant beyond the .05 level: F (2, 751) = 6.32; $p < .01$. However, the partial eta squared (η_p^2) value computed was only at .02 indicating that it has a small effect size.

Nevertheless, Post hoc Scheffe multiple comparisons test was administered to determine specifically which groups differ significantly in their mean perceived Costs of Exercise (Cons) scores. The results of the post hoc tests are presented in Table 4.12.4. The results showed that the Chinese participants were significantly different from the Malay (mean difference = .75) participants in their perceived Costs of Exercise (Cons) but were not significantly different from the Indian teacher trainees. However,

there was also no significantly difference between the Malays and the Indians (mean difference = -.52) in their perceived Costs of Exercise (Cons).

Table 4.12.4

*Scheffe Multiple Comparisons of the Perceived Costs of Exercise (*Cons*) Scores among the four Age-Groups*

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	-0.75*	0.23	0.01	-1.32	-0.18
Malay	Indian	-0.52	0.27	0.15	-1.18	0.14
Chinese	Indian	0.23	0.33	0.78	-0.58	1.04

*. The mean difference is significant at the 0.05 level.

In brief**,** no statistically significant difference was detected for the teacher trainees in terms of their perceived Costs of Exercise (Cons) between the two genders and among their age groups. However, there was a statistically significant difference in the teacher trainees' perceived Costs of Exercise (Cons) among the three ethnic groups.

c) Processes of Change

Processes of Change Questionnaire (PCQ) developed by Marcus, Rossi, Selby, Niaura, and Abrams (Marcus et al., 1992c) measures the covert (cognitive) and overt (behavioural) actions used by individuals as they progress through the various stages of change. This 39-item scale, represent 10 processes of change which can be further organized into two higher order constructs, specifically the cognitive or experiential process, and the behavioural process.

i. Cognitive or Experiential Processes of Change

The independent sample *t*-test was conducted to investigate whether the cognitive process of change used differ between the male teacher trainees and female teacher trainees. The results in Table 4.13.1 revealed that the cognitive process of change mean scores for the 306 male participants was 3.58 (*SD* = .59) whereas the 448 female participants had a lower mean of 3.41 (SD = .61).

Table 4.13.1
Independent Samples t-Test Comparison of Cognitive Process of Change by Gender

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	14.31	2.38	3.79	.00	.28
Female	448	13.63	2.46			

The Levene's test for equality of variances indicated that there was no violation of assumption $F = .12$, $p > .05$) and therefore the equal variance assumed *t*-statistic was used for evaluating the hypothesis of equality of means. The results from the *t*-test conducted demonstrated that there was a significant difference in the cognitive process of change mean scores between the male and the female teacher trainees, t ($df = 752$) = 3.79, $p < .01$ and the Cohen's $d = .28$, which was within the range of a small effect size.

To establish whether the teacher trainees' cognitive process of change would differ among age-groups of the participants, a one-way analysis of variance (ANOVA) was computed. Table 4.13.2 shows the mean and the ANOVA results.

Table 4.13.2

ANOVA Comparison of Cognitive Process of Change by Age-Groups

Cognitive Process of Change	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	1.95	3	.65	1.74	.16	.01
Within Groups	280.11	750	.37			
Total	282.06	753				

The results of the Levene's test for equality of variances indicated homogeneity of variances among the four age-groups $F = .21$, $p > .05$. The cognitive process of change mean scores for the four age-groups indicated that the 21 years old age-group has the highest cognitive process of change scores ($M = 14.14$, $SD = 2.45$) followed by 19 years old and below age-group ($M = 14.07$, $SD = 2.31$), the 22 years old and above age-group ($M = 13.73$, $SD = 2.68$) and then the 20 years old age-group ($M = 13.70$, $SD = 2.46$) respectively.

However, the one-way ANOVA showed that the F value to be not significant beyond the .05 level: F (3, 750) = 1.74; p = .16. In other words, there was no significantly difference in the cognitive process of change among the teacher trainees with reference to their age-groups. Subsequently, the partial eta squared generated was only .01 verifying that it was a small effect size.

To explore if there are any differences in the cognitive process of change of the teacher trainees from the three ethnic groups, one-way analysis of variance (ANOVA) was computed. Table 4.13.3 summarizes the results of the ANOVA test.

Table 4.13.3

ANOVA Comparison of Cognitive Process of Change by Ethnicity

Cognitive process of change	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	443.45	2	221.73	40.92	.00	.10
Within Groups	4069.50	751	5.42			
Total	4512.95	753				

The output of the Levene's test for equality of variances indicated heterogeneity (unequal) variances among the three ethnicity groups $F = 3.04$, $p < .05$ and therefore required to exercise caution in the interpretation of results. The cognitive process of change mean scores for the three ethnic groups were Malay ($M = 14.16$, $SD = 2.27$), Chinese ($M = 12.06$, $SD = 2.63$), and the Indian ($M = 14.61$, $SD = 2.28$). The one-way ANOVA results showed F to be significant beyond the .05 level: F (2, 751) = 40.92; $p <$ .01. Accordingly, the partial eta squared computed was .10 indicating of a medium to large effect size.

Taking into consideration the presence of heterogeneity (unequal) of variances among the three ethnicity groups, the Games-Howell follow-up post hoc multiple comparisons test was used instead. The post hoc tests as shown in Table 4.13.4 suggested that the Chinese participants were significantly different from the Malay (mean difference = -2.10) and Indian (mean difference = -2.55) participants in their cognitive process of change mean scores. In spite of this, there was no significantly difference between the Malays and the Indians (mean difference = -.45) in their cognitive process of change mean scores.

Table 4.13.4

Games-Howell Multiple Comparison of Cognitive Process of Change Scores among the three Ethnic Groups.

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	2.10*	.27	.00	1.46	2.74
Malay	Indian	- .45	.28	.23	-1.11	.20
Chinese	Indian	-2.55*	.36	.00	-3.41	-1.70

*. The mean difference is significant at the 0.05 level.

In short, there were statistically significant differences in the teacher trainees' cognitive process of change between the two genders and among the three ethnic groups. Then again, there was no statistically significant difference in the teacher trainees' cognitive process of change with regard to their age groups.

ii. Behavioural Processes of Change

The independent sample *t*-test was conducted to investigate whether the behavioural process of change used differ between the male teacher trainees and female teacher trainees.

The results shown in Table 4.14.1 revealed that the behavioural process of change mean scores for the 306 male participants was 14.90 (*SD* = 2.29) whereas the 448 female participants demonstrated a lower mean of 13.81 (SD = 2.67). The results of the Levene's test for equality of variances shows that $F = 7.27$ has a $p < .05$, indicating the violation of the assumption of homogeneity of variances between the two genders and therefore, necessitate the use of the separate variance *t*-test (equal variance not assumed) instead. The results from the *t*-test conducted revealed that there was a

significant difference in the usage of the behavioural process of change between the male teacher trainees and the female teacher trainees, t (df = 714.4) = 5.99, p < .01. The results indicated that the male teachers' trainees employed more of behavioural process of change strategy than the female teacher trainees. However, the Cohen's d = .43, which is in the range of a small effect size suggested that the differences was small.

Table 4.14.1

Independent Samples t-Test Comparison of Behavioural Process of Change by Gender

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	14.90	2.29	5.99	.00	0.43
Female	448	13.82	2.67			

To ascertain whether the teacher trainees' behavioural process of change would differ among age-groups of the participants, one-way analysis of variance (ANOVA) was computed. Table 4.14.2 shows the mean and the ANOVA results.

Table 4.14.2

ANOVA Comparison of Behavioural Process of Change by Age-Groups

Behavioural Process of Change	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	37.35	3.00	12.45	1.88	0.13	.01
Within Groups	4955.86	750.00	6.61			
Total	4993.21	753.00				

Levene's test for equality of variances indicated homogeneity of variances among the four age-groups, $F = .43$, $p > .05$). The behavioural process of change mean scores for the four age-groups were as follow; 19 years old and below group (M = 14.36, SD = 2.42), 20 years old (M = 14.25, SD = 2.62), 21 years old (M = 14.41, SD = 2.57), and the 22 years old and above group (M = 13.59, SD = 2.74). The one-way ANOVA showed F-value to be not significant beyond the .05 level: F (3, 750) = 1.88; p = .13. This suggested that the behavioural process of change among the four age-groups were comparable. Consequently, the partial eta squared generated was only .01 confirming that it was a small effect size.

In order to examine if there were any differences in the behavioural process of change of the teacher trainees among the three ethnic groups, one-way analysis of variance (ANOVA) was computed. Table 4.14.3 provides a summary of the results of the ANOVA test.

Table 4.14.3

ANOVA Comparison of Behavioural Process of Change by Ethnicity

Behavioural Process of Change	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	389.83	2	194.91	31.80	.00	.08
Within Groups	4603.38	751	6.13			
Total	4993.21	753				

The Levene's test for equality of variances indicated homogeneity of variances among the three ethnicity groups, $F = 2.73$, $p > .05$. The behavioural process of change mean scores for the three ethnic groups were as follow; Malay (M = 14.46, SD = 2.49), Chinese (M = 12.57, SD = 2.65), and the Indian (M = 15.12, SD = 2.09). The one-way

ANOVA showed F to be significant beyond the .05 level: F (2, 751) = 31.80; $p < .01$. Consequently, the partial eta squared value was at .08 implying it has a medium effect size.

To determine specifically which groups differ significantly on their behavioural process of change mean scores, pair-wise comparisons were evaluated with Scheffe post hoc test. The results of the post hoc tests are presented in Table 4.14.4.

As illustrated in Table 4.14.4, post hoc Scheffe test showed that the Chinese participants were significantly different from the Malay participants (mean difference = -.47) and they were significantly different from Indian participants (mean difference = -.64) in their behavioural process of change mean scores. However, no significant difference was detected between the Malay and the Indian teacher trainees (mean difference = -.16) in their behavioural process of change mean scores.

Table 4.14.4

Scheffe Multiple Comparisons of the Behavioural Process of Change among the four Age-Groups

(I) Race3	(J) Race3	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	1.89*	0.26	0.00	1.26	2.53
Malay	Indian	-0.66	0.30	0.09	-1.39	0.08
Chinese	Indian	-2.55*	0.37	0.00	-3.45	-1.65

*. The mean difference is significant at the 0.05 level.

In summary, there were statistically significant differences in the teacher trainees' behavioural process of change between the two genders and among the three ethnic groups. Nevertheless, there is no statistically significant difference in the teacher trainees' behavioural process of change in relation to their age groups.

d) Physical Self Perception

Physical Self-Perception Profile (PSPP) developed by Fox and Corbin (1989) measures the sub-domains of self-esteem in the physical domain in an effort to predict physical activity level (Boyd et al., 2002; Fox & Corbin, 1989; Sonstroem et al., 1992). The PSPP assesses the physical self-perceptions through four sub-domains namely; Perceived sport competent (sport), Perceived Physical conditioning (condition), Perceived Bodily attractiveness (body), and Perceived Physical strength (strength). For this analysis, a composite score comprising the four sub-domains was taken to represent the overall physical self-perceptions of the teacher trainees.

To investigate whether the physical self-perception differs between the male teacher trainees and female teacher trainees, the independent sample *t*-test was conducted. The results shown in Table 4.15.1 revealed that the physical self-perception mean score for the 306 male participants was 30.21 (*SD* = 4.81) whereas the 448 female participants indicated a lower mean score of 28.05 (*SD* = 4.92).

Table 4.15.1
Independent Samples t-Test Comparison of Physical Self Perception by Gender

Group	*n*	*M*	*SD*	*t*	*p*	*d*
Male	306	30.21	4.81	5.97	.00	0.44
Female	448	28.05	4.92			

The Levene's test for equality of variances indicated no violation of assumption $F = .99$, $p > .05$ and therefore the equal variance assumed *t*-statistic can be used for evaluating the hypothesis of equality of means. The result from the *t*-test computed revealed the difference in the mean physical self-perception scores between the male

and the female teacher trainees was significant, t (df = 752) = 5.97, p < .01. Cohen's d = .44, which is in the range of a small effect size.

To establish if there was a difference between the teacher trainees' physical self-perception between age-groups of the participants, one-way analysis of variance (ANOVA) was computed. Table 4.15.2 shows the ANOVA results.

Table 4.15.2

ANOVA Comparison of Physical Self Perception by Age-Groups

Physical Self-Perception	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	22.65	3	7.55	.30	.82	.001
Within Groups	18713.53	750	24.95			
Total	18736.17	753				

The Levene's test for equality of variances indicated homogeneity of variances among the four age-groups (F = .77, p >.05). The mean physical self-perception scores for the four age-groups were; 19 years old and below group (M = 28.99, SD = 4.85), 20 years old (M = 28.96, SD = 4.79), 21 years old (M = 28.68, SD = 5.26), and the 22 years old and above group (M = 29.30, SD = 5.49).

The one-way ANOVA showed F to be not significant at the .05 level: F (3, 750) = .30; p = .82. This suggested that the physical self-perceptions among the four age-groups of the teacher trainees were similar. Consequently, the partial eta squared generated was only .001 confirming that it has a very small effect size.

Subsequently, to investigate if there were any differences in the physical self-perception of the teacher trainees from the three ethnic groups, one-way analysis of variance (ANOVA) was computed. Table 4.15.3 summarizes the results of the ANOVA test.

Table 4.15.3

ANOVA results for Physical Self Perception by Ethnicity

Physical Self Perception	*SS*	*df*	*MS*	*F*	*p*	η_p^2
Between Groups	999.64	2	499.82	21.16	.00	.05
Within Groups	17736.53	751	23.62			
Total	18736.17	753				

The Levene's test for equality of variances indicated homogeneity of variances among the three ethnicity groups (F = .56, p >.05). The physical self-perception mean scores for the three ethnic groups were as follow; Malay (M = 29.23, SD = 4.89), Chinese (M = 26.26, SD = 4.89), and the Indian (M = 30.44, SD = 4.58). The one-way ANOVA results showed F to be significant at the .05 level: F (2, 751) = 21.16; p < .01. Conversely, the partial eta squared = .05 indicating that it has a small effect size.

Scheffe post hoc multiple comparisons test was conducted to determine explicitly which groups differ significantly on their mean physical self-perception scores. The results of the post hoc tests are presented in Table 4.15.4. The Scheffe multiple comparisons test showed that the Chinese participants were significantly different from the Malay (mean difference = -2.97) and the Indian (mean difference = -4.19) participants in their physical self-perception mean scores. Nevertheless, there

was no significantly difference between the Malays and the Indians (mean difference = -1.22) in their physical self-perception mean scores.

Table 4.15.4

Scheffe Multiple Comparisons of the Physical Self Perception Scores among the three Ethnic Groups

(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Malay	Chinese	2.97*	0.51	0.00	1.72	4.22
Malay	Indian	-1.22	0.59	0.12	-2.66	0.22
Chinese	Indian	-4.19*	0.72	0.00	-5.96	-2.41

*. The mean difference is significant at the 0.05 level.

To sum up, there were statistically significant differences in the teacher trainees' physical self-perception between the two genders and among the three ethnic groups. However, there was no statistically significant difference in the teacher trainees' physical self-perception in term of their age groups.

4.8 Research Question 4

What are the relative strength of the psychological variables in terms of (a) self-efficacy, (b) decisional balance (c) processes of change, and (d) physical self-perception profile in predicting the different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees?

a) Correlations between the Transtheoretical Model Constructs

The above research question was answered through the computation of the correlations between the Transtheoretical Model Constructs. Table 4.16 displays the results of the correlation analysis to determine the relationships between the constructs of the Transtheoretical Model together with the Physical Self-Perception variable. An examination of the correlations between the constructs of the Transtheoretical Model indicated that all of the variables were significantly ($p < .01$) correlated to the stages of exercise (SEC).

The physical activity level was the most closely correlated to the Stages of Exercise ($r = .51$). The Behavioural Process of Change was the next most closely correlated to the stages of exercise ($r = .41$). This suggests that the Behavioural Processes of Change which refers to the overt (behavioural) actions used by individuals to help them progress through the different stages of change is perceived by the participants as an important strategy to get them through the various stages of change. The other closely correlated construct with the stages of exercise change was Perceived Benefits of Exercise or Pros ($r = .40$). This was followed by the Self-Efficacy ($r = .39$), Cognitive Processes of Change ($r = .37$), the Physical Self-Perception ($r = .32$) and Perceived Costs of Exercise or Cons ($r = -.17$). The Cons was also the only variable that was negatively correlated with the Stages of Exercise.

Table 4.16

Correlation Matrices of the Transtheoretical Model Constructs

	Constructs	1	2	3	4	5	6	7	8
1	SEC	-	.51**	.39**	.40**	-.17**	.37**	.41**	.32**
2	PAL		-	.30**	.33**	-.11**	.32**	.36**	.25**
3	SE			-	.39**	-.03	.40**	.44**	.28**
4	sqPros				-	-.21**	.61**	.62**	.29**
5	Cons					-	-.11**	-.14**	-.16**
6	C_POC						-	.79**	.35**
7	B_POC							-	.34**
8	PSP								-
	M	3.47	38.81	10.84	71.34	7.48	13.90	14.26	28.93
	SD	1.06	23.04	2.81	20.14	2.24	2.45	2.58	4.99

Note: SEC = Stages of Change, SE = Self-Efficacy, PAL = Phyical Activity Level,
Pros = Perceived Benefits of Exercise, Cons = Perceived Costs of Exercise,
C_POC = Cognitive Processes of Change , B_POC = Behavioural Processes of Change,
PSP = Physical Self-Perception Profile

**. Correlation is significant at the 0.01 level (2-tailed).

Assessment of inter-correlations revealed that all the variables of the TTM constructs were they themselves significantly interrelated (ranging from -.11 to .79) except for one correlation between Perceived Costs of Exercise (Cons) and Self-efficacy (r = -.03) which was not significant at the .05 level. All the variables of the TTM constructs were also positively correlated with each other except with the variable Perceived Costs of Exercise (Cons). In other words, all correlations with the variable Perceived Costs of Exercise (Cons) were negatively correlated.

b) Differences in Transtheoretical Model Constructs Across the Stages of Exercise

Table 4.17 exhibits the results of MANOVA to determine the differences in various Transtheoretical Model constructs specifically the Self-Efficacy, the Perceived Benefits (Pros) and Costs of Exercise (Cons), the Cognitive and the Behavioural Processes of Change of the teacher trainees in terms of their Stages of Exercise behaviour. Using Wilks' lambda criterion, all the dependent variables (constructs) were significantly affected (different) by the Stages of Exercise behaviour, Wilks' lambda = .65, F (14, 1490) = 25.82, $p < .001$, partial eta squared = .19 which by Cohen's standard (Meyers et al., 2006), accounted for a large effect size.

Overall, the Physical Activity Level as measured through the weekly leisure-time exercise scores were capable of differentiating individuals (teacher trainees) at the different stages of exercise behaviour, F (2, 751) = 125.53, $p < .001$. The Scheffe post hoc multiple comparisons test revealed significantly lower scores in the weekly leisure-time exercise scores of the teacher trainees who were from the Pre-contemplation/Contemplation stage with trainees in the preparation stage and in maintenance stage. Teacher trainees in the preparation stage was also significantly lower in their weekly leisure-time exercise scores compared to trainees in maintenance stage

Similarly, the mean scores for self-efficacy increased across stages of exercise. The self-efficacy construct significantly differentiated the trainees at three different stages of exercise change, F = (2, 751) = 62.85, $p < .001$. Scheffe post hoc tests showed that the trainees were significantly different among the three stages of exercise and that trainees in the Pre-contemplation/Contemplation and Preparation stage have significantly lower self-efficacy for exercise from the trainees in the maintenance stage. However, there was no significant difference between trainees from the

Pre-contemplation/ Contemplation stage with trainees from Preparation stage in their self-efficacy for exercise.

In terms of the Decisional Balance constructs, the mean scores for the perceived Benefits of Exercise (Pros) increased across stages of exercise (F = [2, 751] = 60.59, p < .001). The Scheffe post hoc tests disclosed that teacher trainees in the Pre-contemplation/Contemplation stage have significantly lower perceived Benefits of Exercise (Pros) than the trainees in the preparation and maintenance stage. Similarly, teacher trainees in the preparation stage was also significantly lower in their perceived Benefits of Exercise (Pros) compared to trainees in maintenance stage

Nonetheless, for the perceived Costs of Exercise (Cons), the mean scores displayed a decrease across the different stages of exercise (F = [2, 751] = 7.50, p < .01). The Scheffe post hoc tests revealed that the teacher trainees from the Pre-contemplation/Contemplation stage were not significant different from trainees in the Preparation stage in their perceived Costs of Exercise (Cons). However, trainees from the Pre-contemplation/Contemplation and Preparation stage were found to have significantly higher perceived Costs of Exercise (Cons) than teacher trainees who were in the maintenance stage.

The Processes of Change construct was measured through its two subdimensions namely Cognitive Processes of Change and Behavioural Process of Change. The Processes of Change had significantly differentiated the trainees across the stages of exercise. Both the cognitive processes (F = [2, 751] = 55.830, p < .001) and the behavioural processes (F = [2, 751] = 66.958, p < .001) of exercise significantly increased across stages of exercise. Scheffe post hoc tests revealed that the teacher trainees from the pre-contemplation/contemplation stage used significantly lesser in both their cognitive processes and the behavioural processes of change for exercise compared to trainees who were in the preparation stage. Concurrently, teacher trainees

from the preparation stage were found to also utilize significantly lesser in both their cognitive processes and the behavioural processes of exercise compared to trainees who were in the maintenance stage.

Likewise, the physical self-perceptions mean score also indicated that it increased across stages of exercise. The physical self-perceptions construct significantly differentiated the trainees at the three different stages of exercise change (F = [2, 751] = 36.659, p < .001). The Scheffe post hoc tests disclosed that trainees in the Pre-contemplation/Contemplation and Preparation stage have significantly lower physical self-perceptions compared to the trainees in the maintenance stage. However, there was no significant difference between trainees from the Pre-contemplation/ Contemplation stage and Preparation stage in their physical self-perceptions.

In addition, standardized effect size (Partial Eta Squared, η_p^2) was calculated to assess the meaningfulness of the results. Using Cohen's classification of effect size with equivalent values of Partial Eta Squared (.01≤ η_p^2 < .06 = small, .06 ≤ η_p^2 < .14 = medium, η_p^2 > .14 = large), the effect sizes observed in this study range from small to large (Kinnear & Gray, 2006).

As shown in Table 4.17, the large effect sizes were observed in the Weekly Leisure-Time Exercise (η_p^2 = .25), and the Behavioural Processes of Change (η_p^2 = .15) while medium effect sizes were observed for Self-Efficacy (η_p^2 = .14), Perceived Benefits of Exercise or Pros (η_p^2 = .14), Cognitive Processes of Change (η_p^2 = .13) and the Physical Self Perception (η_p^2 = .09) of the trainees across the stages of exercise behaviour. The only variable to have just a small effect size was the Perceived Costs of Exercise or Cons (η_p^2 = .02).

Table 4.17

Means, standard deviation of the Transtheoretical Model constructs across the Stages of Exercise Change

Variables		PCon/Con (*n*=106)	Prep (*n*=372)	Act/Main (*n*=276)	Total (*N*=754)	*F* = (2,751)	η_p^2	Scheffe Post Hoc
PAL	*M*	20.48	33.62	52.86	38.81	125.53	0.25	PC/C < P < A/M
	SD	14.91	19.35	22.34	23.04			
SE	*M*	9.65	10.15	12.22	10.84	62.85	0.14	PC/C = P < A/M
	SD	2.87	2.60	2.49	2.81			
sqPros	*M*	59.34	67.98	80.46	71.34	60.59	0.14	PC/C < P < A/M
	SD	22.59	18.95	16.64	20.14			
Cons	*M*	8.05	7.59	7.12	7.48	7.50	0.02	PC/C = P > A/M
	SD	2.11	2.16	2.33	2.24			
C_POC	*M*	12.59	13.47	15.00	13.90	55.83	0.13	PC/C < P < A/M
	SD	2.33	2.35	2.19	2.45			
B_POC	*M*	12.88	13.71	15.52	14.26	66.96	0.15	PC/C < P < A/M
	SD	2.45	2.51	2.15	2.58			
PSP	*M*	27.12	28.03	30.84	28.93	36.41	0.09	PC/C = P < A/M
	SD	4.65	4.84	4.72	4.99			

Note: PCon = Pre-contemplation, Con = Contemplation, Prep = Preparation, Act = Action, Main = Maintenance

PAL = Physical Activity Level, SE = Self-Efficacy, sqPros = Benefits of Exercise (Pros), Cons = Costs of Exercise,

C_POC = Cognitive Processes of Change, POC-B = Behavioural Processes of Change, PSP = Physical Self-Perception Profile

** $p < .001$

4.9 Research Question 5

Does the proposed model for exercise / physical activity fit the data collected?

4.9.1 Model Testing

Building upon the research problems and issues relating to the promotion of physical activity among populations, one of the aims of this study is to develop a theoretical model that will be able to explain the determinants of physical activity involvement. In this regard, the empirical measures conducted for this study particularly aims to examine the relationships between the constructs that were incorporated in the conceptual framework (see Figure 1.1). The model hypothesized interrelationships between multiple independent and dependent variables. Researchers such as Byrne (1998, 2001), Hair et al. (1998), Tabachnich and Fidell (2001) recommended the structural equation modelling (SEM) as a statistical technique when one is attempting to examine simultaneous effects of multiple independent and dependent variables. It is widely acknowledged that SEM is a confirmatory analytical tool and its usefulness lies in its ability to estimate the strength of hypothesized relationships of constructs in the proposed model (Omar-Fauzee & Hamdan, 2004). Hence, in line with the above recommendation, the proposed research model was assessed using the SEM statistical procedure.

SEM generally consists of two parts namely the measurement model and the structural model. According to Ho (2006), the measurement model specifies how the latent variables are measured in terms of the observed variables, and describes the measurement properties of the observed variables. The measurement model is important as it provides a test for the reliability of the observed variables employed to measure the latent variable. The structural model on the other hand, specifies the pattern of relationships between independent and dependent variables either through

observation or latent means. In other words, it provides a direct test of the theory of interest.

However, prior to this step, the measurement model which defines the relations between the observed (indicator) variables and the unobserved (latent) variables, has to be first assessed. This is to ensure the measurement model fits the sample data before proceed to a full model testing. In general, there are two approaches in the conducting of the SEM namely the one-step or two-step approach. The two-step approach initially involves the assessment of the validity of the measurement model. Once the validity of the measurement model is established, the researcher could proceed to the second step, which is the estimation of the overall structural models (Anderson & Gerbing, 1988). The one-step approach involves both the measurement and structural model being estimated simultaneously (Hair et al., 1998). This approach is considered appropriate when the model possesses a strong theoretical rationale and the measures used in the study are highly reliable (Hair et al., 1998). However, most of the researches that employed the SEM techniques prefer the two-step approach (Anderson & Gerbing**,** 1992**;** Byrne**,** 2001; Koufteros, 1999) for the reason that it is difficult to achieve good model fit with the one step approach. Based on this line of reasoning, the two-step approach was utilized in this study.

The Analysis of Moment Structures (AMOS) statistical programme version 16 was utilized to evaluate the measurement models. Consequently, confirmatory factor analyses (CFA) were conducted on four measurement models as follows:

1. the measurement model for self-efficacy for exercise,
2. the measurement for decisional balance in the form of Pros and Cons for exercise,
3. the processes of change (cognitive processes and behavioural processes) and,

4. the physical self-perceptions (sport competence, physical condition, body attractiveness, physical strength).

Once the overall fit of the measurement models using CFA are confirmed, the assessment of the structural model which defines the relations between the unobserved (latent) variables or factors can then be conducted. A set of measures (fit indices) were be employed to determine how well the model fits the data collected.

The following section described further the assessment of the measurement model and the structural model.

4.9.2 Measurement Model Testing

The assessment of the measurement model includes preliminary analysis to determine validity and reliability of the instrument. The validity of an item of a latent variable is determined by the magnitude of the standardized regression estimates (λ) value for the path from an indicator variable to the latent variable in the measurement model. The reliability of all the items in measuring the latent variable is also indicated by the magnitude of the squared multiple correlations (SMC or R^2). As explained by Ho (2006) SMC served as an index of the amount of variance in the measured (observed) indicator variable accounted for by the latent variable. A small SMC value implies a weak relationship and therefore suggests the model is also a weak model.

The overall fit of the measurement model using CFA is obtained from the Maximum Likelihood estimation chi-square (χ^2) statistics and various goodness-of-fit indices generated by AMOS programme. According to Kline (2005), χ^2 is actually a "badness-of-fit" index because the higher the value, the worse the model's correspondence to the data. He further suggests not relying solely on χ^2 statistics as it can be affected by the size of correlations and by the sample size. Specifically for this

study, in addition to the χ^2, other fit indices as suggested by Kline were used to determine the goodness of fit of the variables in the research model. Kline proposed the goodness of fit indices that are currently in practice and recommended for report and interpretation are the chi-square (χ^2), with smaller chi-square value the better along with a *p* value that is greater than .05. Also, alternative indices of fit such as Root Mean Square Error of Approximation (RMSEA) with value below .05 for close fit and values ranging from .05 to .08 for reasonable error of approximation, and for Comparative Fit Index (CFI) with values greater than .90.

To reduce the number of manifest variables or indicators and to facilitate model testing, item parcels were created for all the measuring items in this study. Items parcelling has been recommended for several reasons, namely increase reliability, reduce idiosyncratic variance, provide the tendency for items parcels to be more normally distributed and generate a reduction in the ratio of measured variables to subjects (Coffman & MacCallum, 2005). In the view of Little, Cunningham, Sahar, and Widaman (2002), models with parcelled data are more parsimonious, have less chances for residuals to be correlated or dual loadings to emerge, and lead to reductions in various sources of sampling error .

a) Measurement Model for Self-Efficacy Construct

A confirmatory factor analysis (CFA) was conducted in order to examine the adequacy of the measurement model for self-efficacy. Prior to this, as mentioned earlier, item parcelling was performed for the measuring items to reduce the number of manifest variables or indicators and to facilitate model testing for the measurement model (Coffman & MacCallum, 2005; Little et al., 2002).

Table 4.18.1

Summarized CFA results for the Measurement Model of Self-Efficacy

Construct	Std regression (loading)	Critical ratio	Composite Reliability	R^2	AVE	Cronbach's Alpha
Self-Efficacy			.81		.47	.80
SE1	0.79	1.00		0.63		
SE2	0.77	0.92		0.59		
SE3	0.69	0.89		0.48		
SE4	0.69	0.88		0.47		
SE5	0.44	0.62		0.19		

As shown in Table 4.18.1, the model yielded χ^2 value of 26.1 with degree of freedom (*df*) = 5, and $p < .001$ indicating that the measurement model for self-efficacy fit adequately with the sample data collected. As χ^2 statistics can be sensitive to sample size, alternative indices of fit in addition to the χ^2 statistics were also used to evaluate the model. All other indices of fit (CFI = .982, GFI = .987, RMR = .024, and RMSEA = .075) were within the recommended threshold values and hence, indicating acceptable model fit.

However, further inspection on the model revealed parcelled item SE5 has a low loading and that the average variance explained (AVE) was .47 which was marginally below the recommended value of .50. In an attempt to improve the model's overall fit, parcelled item SE5 was dropped specifically for its low loading on the factor and the model respecifed. Figure 4.2 illustrates the final measurement model for Self-Efficacy after respecification.

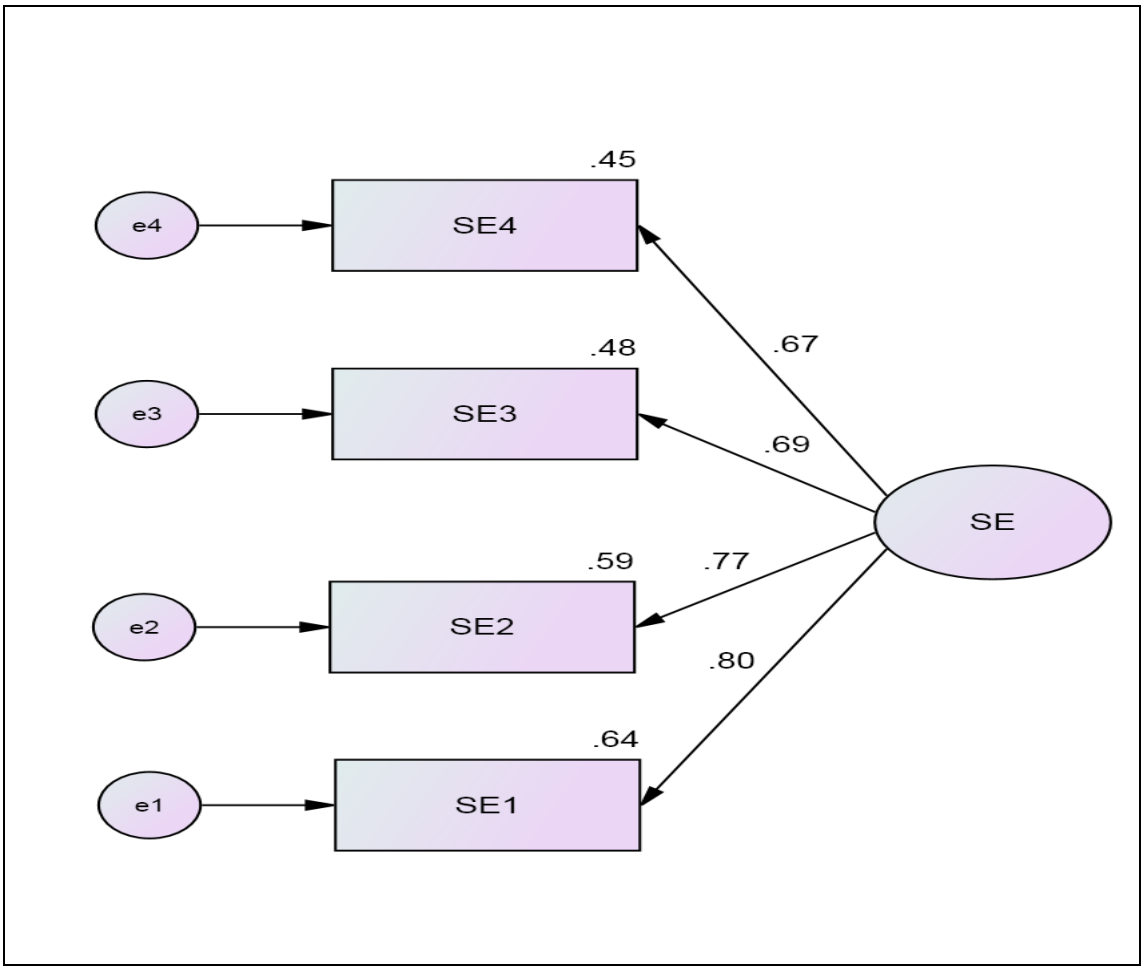


Figure 4.2: Measurement model for Self-Efficacy

Consequently, all index of fit as shown in Table 4.18.2 indicated improved fitting indices. The respecified model yielded a smaller χ^2 value of 8.3 with degree of freedom (*df*) = 2, and *p* = .016. Although the χ^2 value continue to indicate that the measurement model for self-efficacy was inadequately fit with the sample data collected, alternative indices of fit in addition to the χ^2 statistics have however, indicated acceptable fitting indices (CFI = .994, GFI = .994, RMR = .012, and for RMSEA = .065) that are within the recommended values. Therefore, the four remaining parcelled items were used for the subsequent analysis.

Table 4.18.2

Summarized results of revised Measurement Model for Self-Efficacy

Construct	Std. regression (loading)	Critical Ratio (t-values)	Composite Reliability	R^2	AVE	Cronbach's Alpha
Self-Efficacy			.82		.54	.82
SE1[a]	0.80	-		0.64		
SE2	0.77	19.50		0.59		
SE3	0.69	17.80		0.48		
SE4	0.67	17.29		0.45		

[a] Fixed parameter

b) Measurement Model for Decisional Balance (DB)

The confirmatory factor analysis (CFA) was conducted so as to examine the adequacy of the measurement model for Decisional Balance and again, prior to this, item parcelling was performed for the measuring items to reduce the number of manifest variables or indicators and to facilitate model testing for the measurement model. Since two of the items for the perceived Benefits of Exercise (Pros) had violated the assumption of normality (see Table 4.1), a decision had been taken to transform all the items of the perceived Benefits of Exercise (Pros) variables of the Decisional Balance construct by squaring the items in order to facilitate interpretation of the results later.

As indicated in Table 4.19.1, the two factors (Pros and Cons) CFA model for Decisional Balance for exercise yielded χ^2 value of 43.58 with degree of freedom (*df*) = 19, and p = .001 which indicated that the measurement model for decisional balance did not adequately fit with the sample data collected. Although the significant χ^2 implied

that the measurement model for Decisional Balance did not adequately fit with the sample data collected, it was expected since this test has been widely acknowledged sensitive to sample size. However, all other goodness of fit indices used in addition to the χ^2 statistic indicated acceptable fitting indices (CFI = .991, GFI = .986, RMR = .466, RMSEA = .041).

Table 4.19.1

Summarized CFA results for the Measurement Model of Decisional Balance

Construct	Std. Regression (Loading)	Critical Ratio (t-values)	Composite Reliability	R^2	AVE	Cronbach's Alpha
Decisional Balance (Pros**)**			.87		.58	.86
sqDBP1[a]	0.81	-		0.66		
sqDBP2	0.88	27.54		0.78		
sqDBP3	0.83	25.63		0.69		
sqDBP4	0.76	22.86		0.58		
sqDBP5	0.44	11.93		0.19		
Decisional Balance (Cons**)**			.84		.63	.84
DBC1[a]	0.81	-		0.65		
DBC2	0.80	20.43		0.63		
DBC3	0.78	20.27		0.61		

[a] Fixed parameter

Further inspection was carried out on the output of the CFA results and it was found that the sqDBP5 indicator variable has a low loading on the factor Pros and hence it was excluded for the subsequent analysis. As a result, the χ^2 value decreased to 19.78 with degree of freedom (*df*) = 13, and *p* = .101 indicating that this time, the model fit

well with the sample data. Other goodness of fit indices used to evaluate the model also revealed acceptable values within the recommended thresholds (CFI = .997, GFI = .993, RMR = .188, RMSEA = .026).

Table 4.19.2 shows the summarized CFA results for the Measurement model of Decisional Balance.

Table 4.19.2

Summarized CFA results for the Revised Measurement Model of Decisional Balance

Construct	Std. Regression (Loading)	Critical Ratio (t-values)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
Decisional Balance (Pros**)**			.89		.68	.89
sqDBP1[a]	0.81			0.66		
sqDBP2	0.89	27.59		0.79		
sqDBP3	0.83	25.49		0.69		
sqDBP4	0.76	22.58		0.57		
Decisional Balance (Cons**)**			.83		.64	.84
DBC1[a]	0.81			0.65		
DBC2	0.80	20.43		0.63		
DBC3	0.78	20.27		0.61		

[a] Fixed parameter

Figure 4.3 visually illustrates the output path diagram of the final measurement model for Decisional Balance construct.

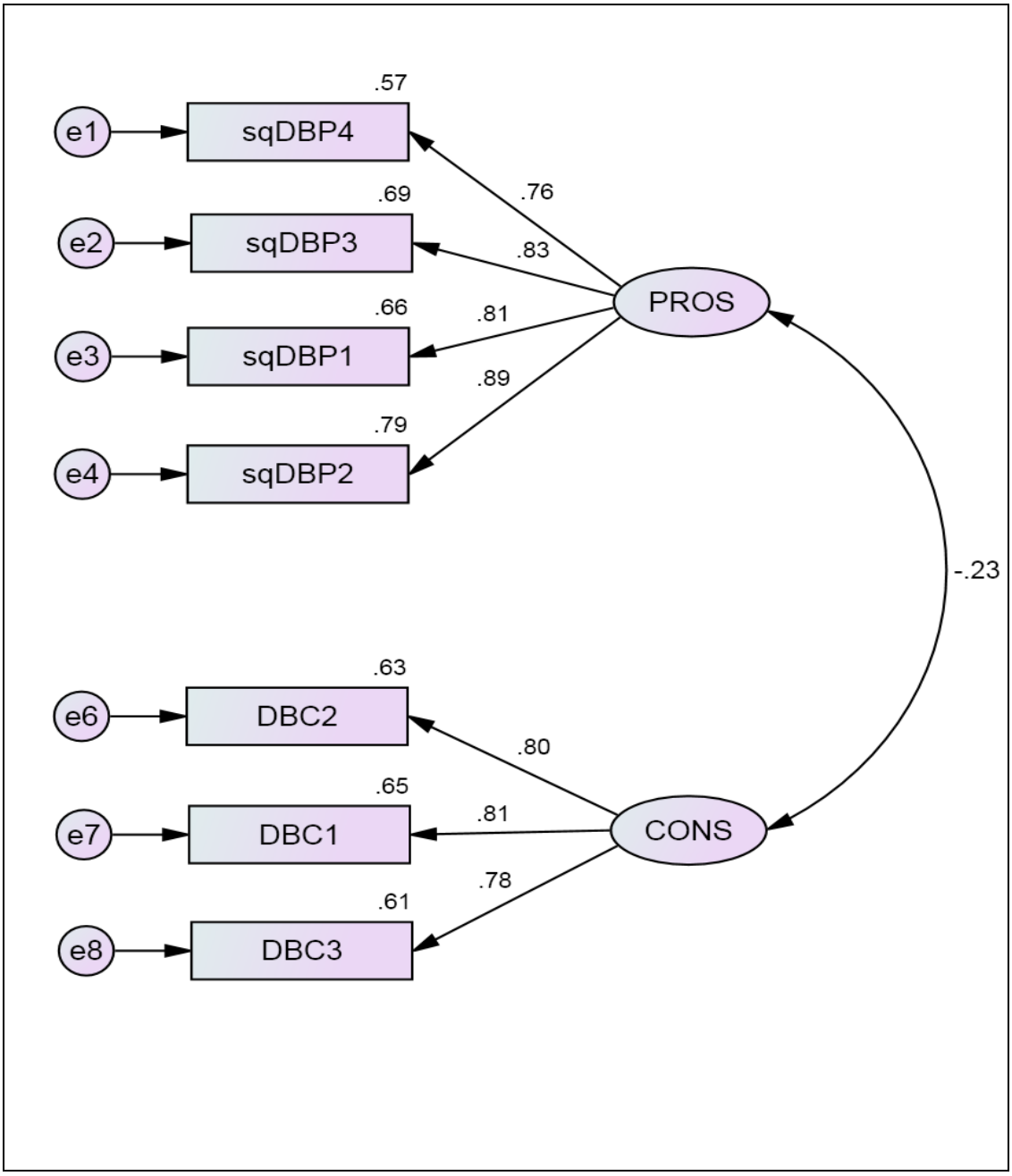


Figure 4.3: Measurement Model for Decisional Balance

c) Measurement Model for Processes of Change (POC)

The hypothesized two factor measurement model for the processes of change was also examined using confirmatory factor analysis (CFA). The measurement model for the processes of change was examined using the same technique performed in assessing the Decisional Balance construct. Initially, item parcelling was performed for the measuring items to reduce the number of manifest variables or indicators and to facilitate model testing for the measurement model.

Table 4.20.1

CFA results for the Measurement Model of Processes of Change (POC)

Construct	Std. Regression (Loading)	Critical Ratio (CR)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
POC (Cognitive)			.80		.45	.80
SoL [a]	.59	-		.346		
SR	.81	16.42		.652		
ER	.74	15.56		.548		
DR	.51	11.85		.260		
CR	.66	14.34		.430		
POC (Behavioural)			.82		.49	.81
SC	.55	15.31		.302		
SL [a]	.81	-		.661		
RM	.76	22.76		.581		
HR	.56	15.69		.315		
CC	.77	23.10		.594		

[a] Fixed parameter

As shown in Table 4.20.1 , the two factors (experiential and behavioural) CFA model for Processes of change for exercise yielded χ^2 value of 217.58 with degree of freedom (*df*) = 34, and $p < .001$ indicating that the measurement model for Processes of change did not adequately fit with the sample data collected. However, other measures of goodness of fit indicated that the model represent an adequately fit model (CFI = .94, GFI = .95, RMR = .03) except for RMSEA = .08 which was at boundary of the recommended acceptable value of below .08.

On further inspection, several indicator variables were found to have low loadings on their related factors. Accordingly, these indicator variables that have loadings below 0.55 on the two factors, (Experiential and Behavioural) were dropped from further analysis.

Following the removal of the low loadings indicator variables, the model was again subjected to model assessment (Figure 4.4.1). The χ^2 value for the re-specified two-factor (Cognitive/Experiential and Behavioural) model for Processes of Change for exercise has improved to 83.88 with degree of freedom (*df*) = 19, and $p < .001$. Although the χ^2 test implied that the measurement model for Processes of change still did not fit well with the sample data, other indices of goodness of fit indicated that the model represent an adequately fit model (CFI = .98, GFI = .97, RMR = .02 and RMSEA = .07).

Yet, the correlation observed between the experiential and behavioural factors was .98 (as shown Figure 4.4.1) which was extremely high suggesting that the two factors were essentially measuring the same characteristic and hence it would be impossible to determine which of the two factors was more relevant.

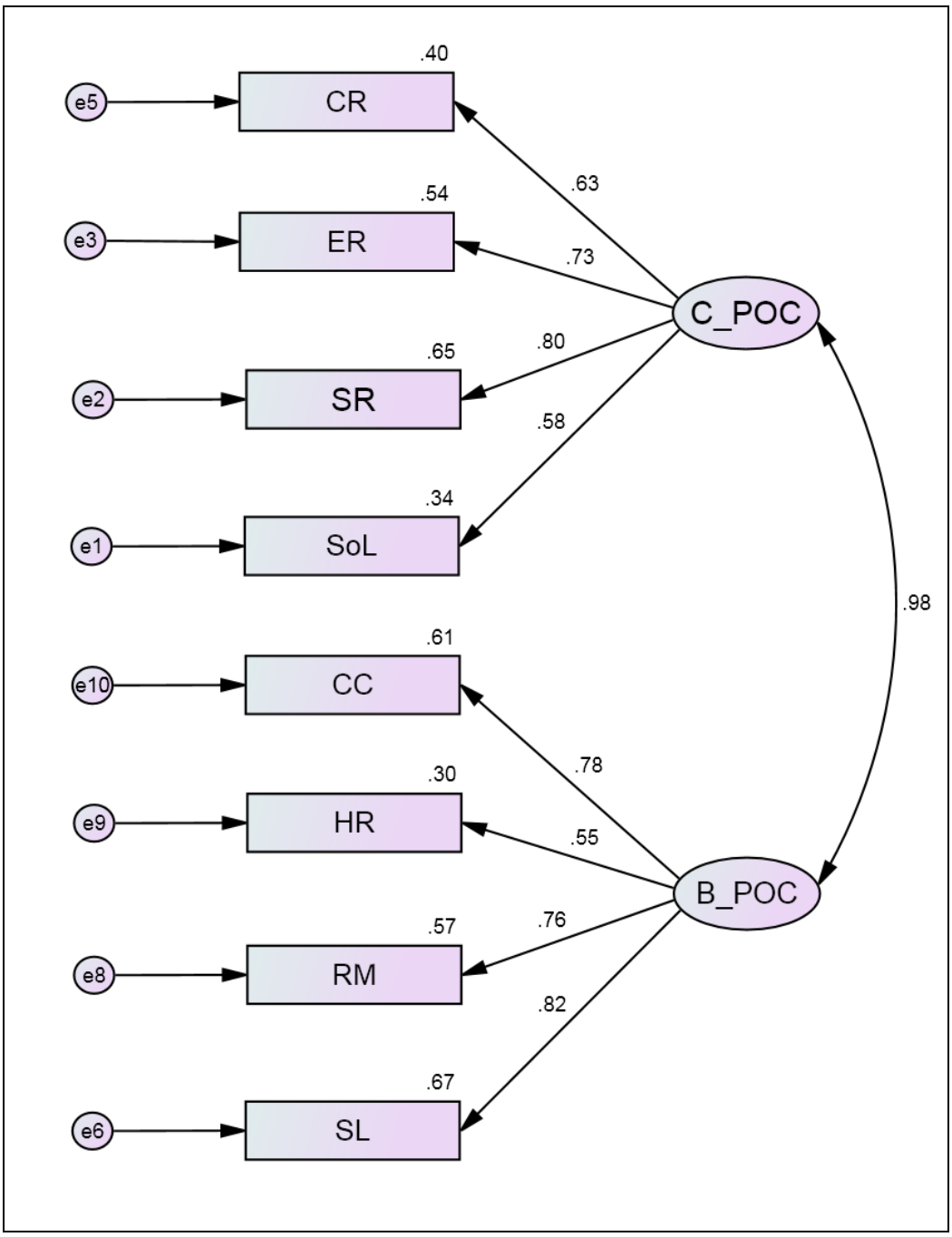


Figure 4.4.1: Measurement model of Processes of Change

Meyers, Gamst and Guarino (2006) advised that as a rule of thumb, a correlation between two variables with a value in the middle of .7 or above should probably not be used in any multivariate analysis. Therefore, in compliance to this guideline, the

Processes of Change Measurement Model was revised from a two factors Process of Change model into a single factor model. The two factors Process of Change model was re-specified by loading all the indicator variables on to a single factor model as shown in Figure 4.4.2 and the CFA results presented in Table 4.20.2.

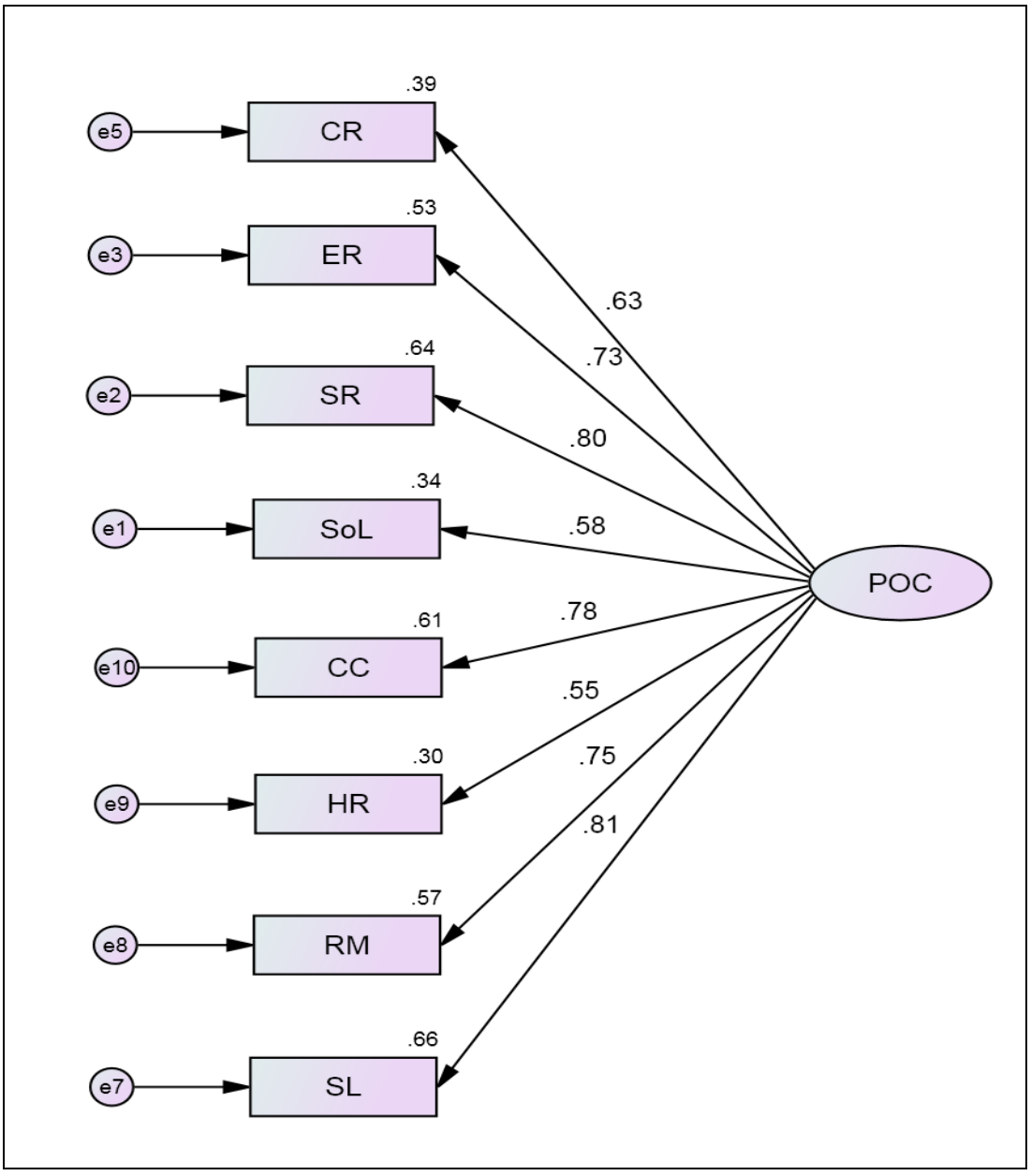


Figure 4.4.2: Revised Measurement Model of Processes of Change

As shown in Table 4.20.2, the revised one factor model for Processes of Change for exercise has remained almost unchanged with χ^2 value increased marginally to 85.96 but with a gain of another degree of freedom (*df*) from 19 to 20, and $p < .001$. Although the χ^2 test still implied inadequate fit with the sample data, additional indices of fit indicated that this model correspond to an adequately fit model (CFI = .98, GFI = .97, RMR = .02 and RMSEA = .07).

Table 4.20.2

CFA results for the Revised Measurement Model of Processes of Change

Construct	Std. Regression (Loading)	Critical Ratio (CR)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
Processes of Change			.89		.56	.88
CR [a]	.63	-		.39		
ER	.73	16.47		.53		
SR	.80	17.66		.64		
SoL	.58	13.87		.34		
CC	.78	17.35		.61		
HR	.55	13.21		.30		
RM	.75	16.95		.57		
SL	.82	17.91		.66		

[a] Fixed parameter

d) Measurement Model for Physical Self Perception

i. First-order Measurement model of Physical Self Perception

Physical Self-Perception Profile (PSPP) measures the sub-domains of self-esteem in the physical domain and assesses the physical self-perceptions through four sub-domains namely; Perceived Sport Competent (Sport), Perceived Physical Conditioning (Condition), Perceived Bodily Attractiveness (Appearance), and Perceived Physical Strength (Strength). Table 4.21.1 shows the CFA results for the first-order Measurement Model for Physical Self Perception.

Table 4.21.1

CFA results for the first-order Measurement Model for Physical Self Perception

Construct	Std. Regression (Loading)	Critical Ratio (CR)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
Sport			0.72		0.46	0.72
SPT3	0.68			0.52		
SPT2	0.63	14.39		0.40		
SPT1	0.72	15.84		0.46		
Conditioning			0.69		0.43	0.69
CDN3	0.65			0.42		
CDN2	0.65	14.42		0.42		
CDN1	0.67	14.85		0.46		
Appearance			0.66		0.41	0.66
APP3	0.58			0.34		
APP2	0.47	10.05		0.22		
APP1	0.81	12.63		0.66		
Strength			0.79		0.55	0.76
STRG3	0.82			0.67		
STRG2	0.80	20.82		0.64		
STRG1	0.59	15.55		0.35		

The χ^2 statistic for the four-factor (Sport Competence, Physical Conditioning, Attractive Body and Physical Strength) CFA model for physical self-perception revealed inadequate model fit with the sample data (χ^2 statistic = 179.01, df = 48, p < .001) but other indices of goodness of fit indicate otherwise such as CFI = .96, GFI = .96, RMR = .02 and RMSEA = .06. All the model fit indices were satisfactory within the recommended acceptable values for good fit.

For all the four factors, all the parcelled items were loaded significantly on their designated factor (critical ratio ranged from 10.05 to 20.82). However, further examination of the item variable found that parcelled item APP2 (.47) has a low loading on its factor (Appearance). Hence, in order to improve the model fit, this item was dropped from subsequent analysis.

Following the exclusion of the low loading item, the model was respecified. The goodness of fit indices, with the exception of the χ^2 statistics, indicated that the model for the revised four-factor CFA model for physical self-perception represent a satisfactory fit to the data collected (χ^2 statistic = 155.85, *df* = 38, *p* < .001, CFI = .96, GFI = .96, RMR = .02 and for RMSEA = .06). The significance of the χ^2 statistics was expected, given the known sensitivity of this statistic to sample size (*N* =754).

The first-order Measurement of the revised model for Physical Self Perception is illustrated in Figure 4.5.1 and CFA results for the first-order Measurement of revised model for Physical Self Perception is presented in Table 4.21.2.

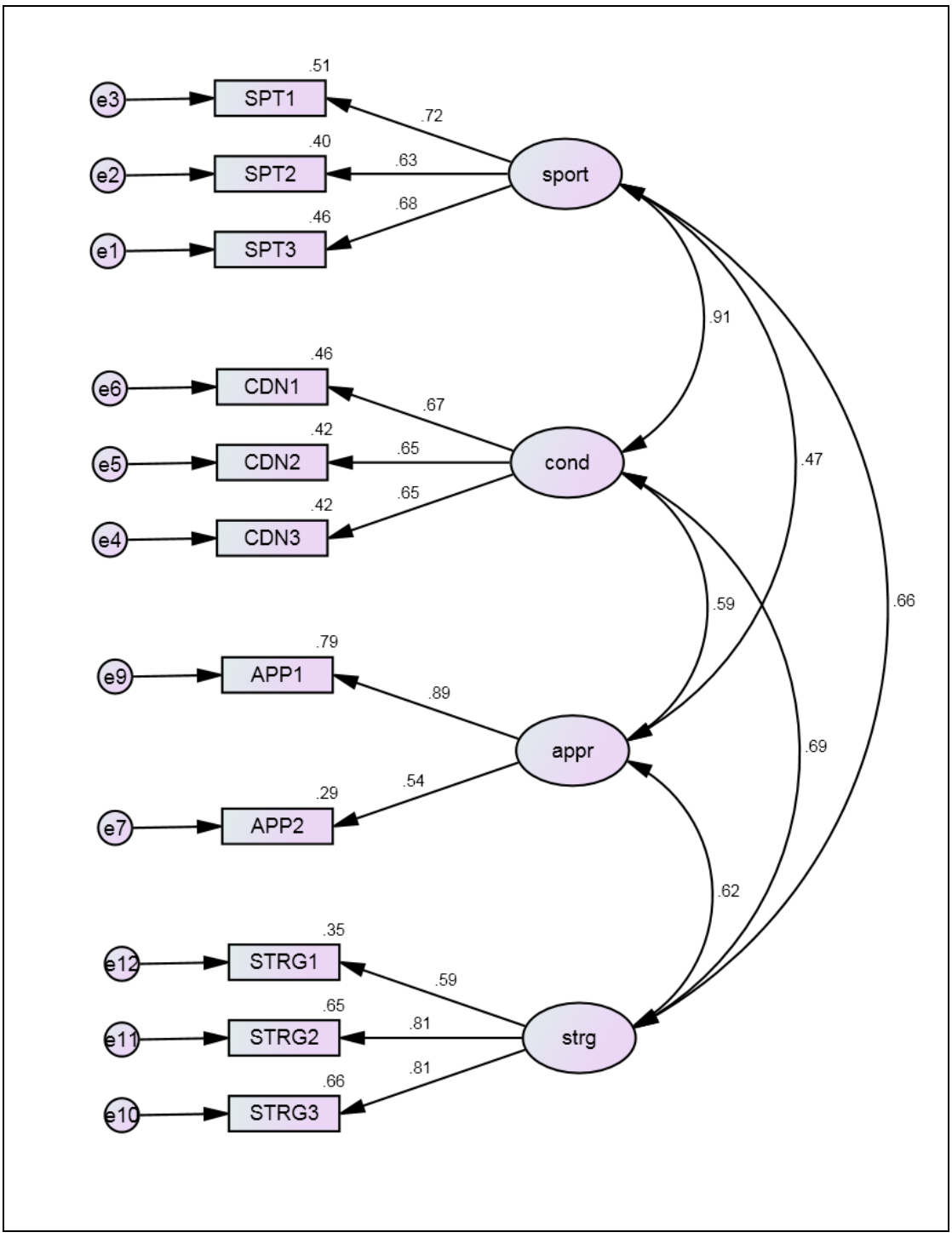


Figure 4.5.1: Measurement Model for Physical Self Perception

Table 4.21.2

CFA results for the first-order Measurement of Revised Model for Physical Self Perception

Construct	Std. Regression (Loading)	Critical Ratio (CR)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
Sport			0.72		0.46	0.72
SPT3	0.68			0.46		
SPT2	0.63	14.39		0.40		
SPT1	0.72	15.84		0.51		
Conditioning			0.70		0.43	0.69
CDN3	0.65			0.42		
CDN2	0.65	14.39		0.42		
CDN1	0.68	14.84		0.46		
Appearance			0.69		0.54	0.65
APR2	0.54			0.29		
APR1	0.89	10.08		0.79		
Strength			0.79		0.55	0.76
STRG3	0.82			0.66		
STRG2	0.81	20.79		0.65		
STRG1	0.59	15.56		0.35		

However, on closer examination of the four factors revealed that the correlation observed between the Sport and the Conditioning factors was .91 (See Figure 4.5.1) which was extremely high signifying that the two factors were most probably measuring

the same characteristics. In other words, the participants in this study might have perceived sport and conditioning as comparable. One possible explanation is that to be sport competence, an individual must also be physically well conditioned in order to demonstrate one's ability in sport. In view of the close relationship of these two factors, it is therefore not astonishing for the participants (teacher trainees) to find it difficult to differentiate these two closely related factors.

Therefore, in adherence to guideline put forth by Meyers, Gamst and Guarino (2006), the measurement of model for Physical Self Perception was again revised from a four factors Physical Self Perception model into a three factors model. The three factors Physical Self Perception model was re-specified by loading all the indicator variables from both the sport factor and the conditioning factor on to a common single factor to be known as Sport/Conditioning factor (SPCD) as shown in Figure 4.5.2.

As illustrated in Figure 4.5.2, the revised three factor model for Physical Self Perception was re-specified by loading all the indicator variables from both the Sport factor and the Conditioning factor on to a single factor known as Sport/Conditioning factor (SPCD). The χ^2 value for the re-specified three factor model for Physical Self Perception has improved to 49.93 with degree of freedom (df) = 17, and $p < .001$. Although the χ^2 test still implied that the measurement model for Physical Self Perception did not adequately fit with the sample data, other indices of goodness of fit have however, indicated that the model represent an adequately fit model (CFI = .984, GFI = .98, RMR = .02 and RMSEA = .05), all within the recommended threshold values.

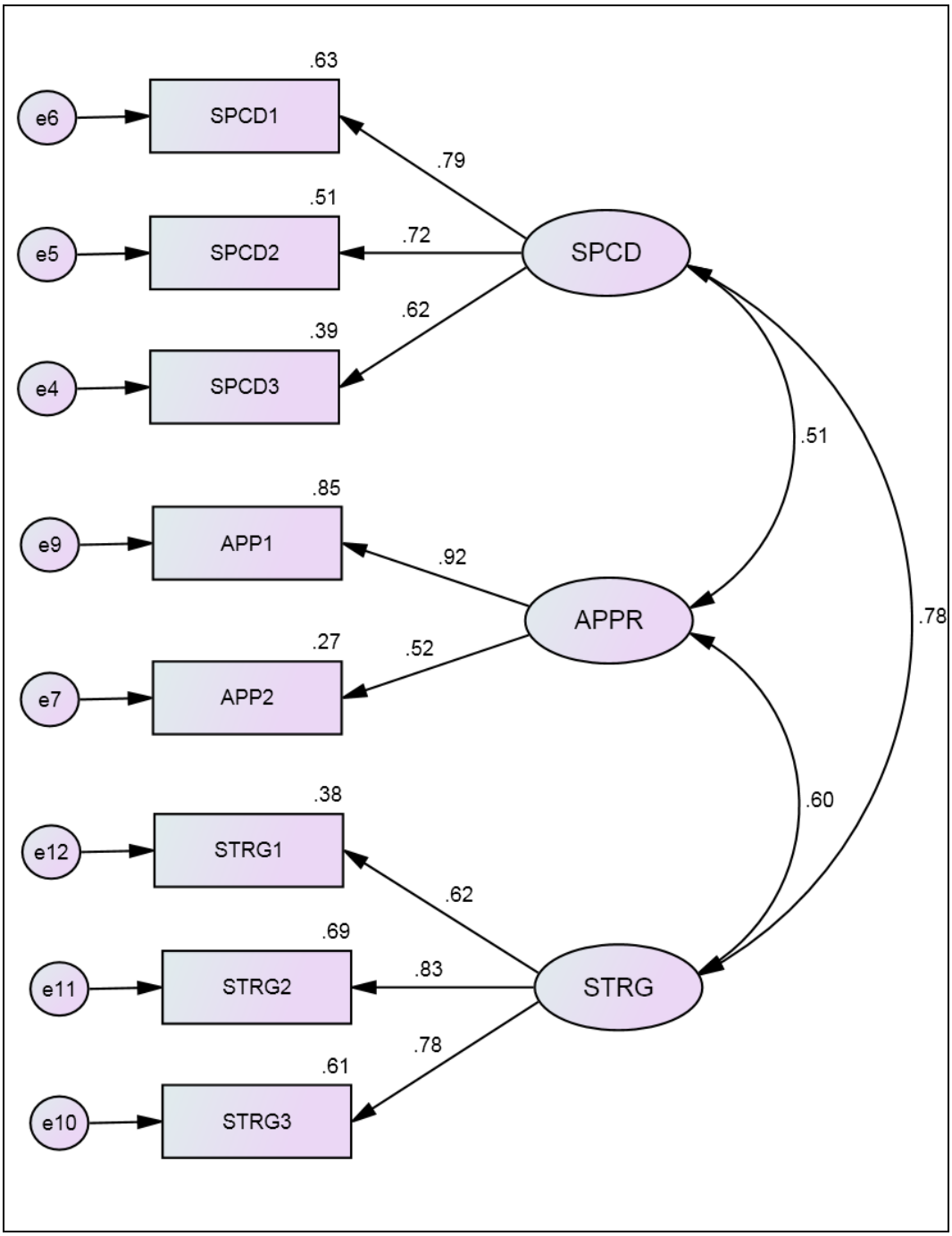


Figure 4.5.2: Revised Measurement Model for Physical Self Perception

CFA results for the first-order revised Measurement Model for Physical Self Perception is presented in Table 4.21.3.

Table 4.21.3

CFA results for the first-order Revised Measurement Model for Physical Self Perception

Construct	Std. Regression (Loading)	Critical Ratio (CR)	Composite Reliability (CR)	R^2	AVE	Cronbach's Alpha
Sport/Conditioning			0.72		0.51	0.76
SPCD3	0.62			0.61		
SPCD2	0.72	14.86		0.69		
SPCD1	0.80	15.59		0.38		
Appearance			0.70		0.56	0.65
APP2	0.52			0.27		
APP1	0.92	9.04		0.85		
Strength			0.79		0.56	0.76
STRG3	0.78			0.61		
STRG2	0.83	21.18		0.69		
STRG1	0.62	16.10		0.38		

ii. Second-order Measurement model of Physical Self Perception

Physical self-perception is portrayed as a higher order (second order) construct, which is accountable for the lower order (first order) which consists of four factors (sport competence, physical conditioning, attractive body and strength competence). The second-order model for Physical self-perception was needed to test whether the three first order latent variables could be explained by the higher order structure.

The results indicated that the second-order model revealed a satisfactory model fit to the data (χ^2 statistic = 49.93, df = 17, $p < .001$, χ^2 / df = 2.94, CFI = .98, GFI = .98, RMR = .01 and for RMSEA = .05). The significance of the χ^2 statistics was expected, which could possibly due to the sample size of this study (N =754). The factor loadings between the three first-order latent variables (Sport/Conditioning, Appearance and Strength) and the second-order factor were .82, .63 and .95 respectively, which were statistically significant. The factor structure of the measurement model is illustrated in Figure 4.5.3.

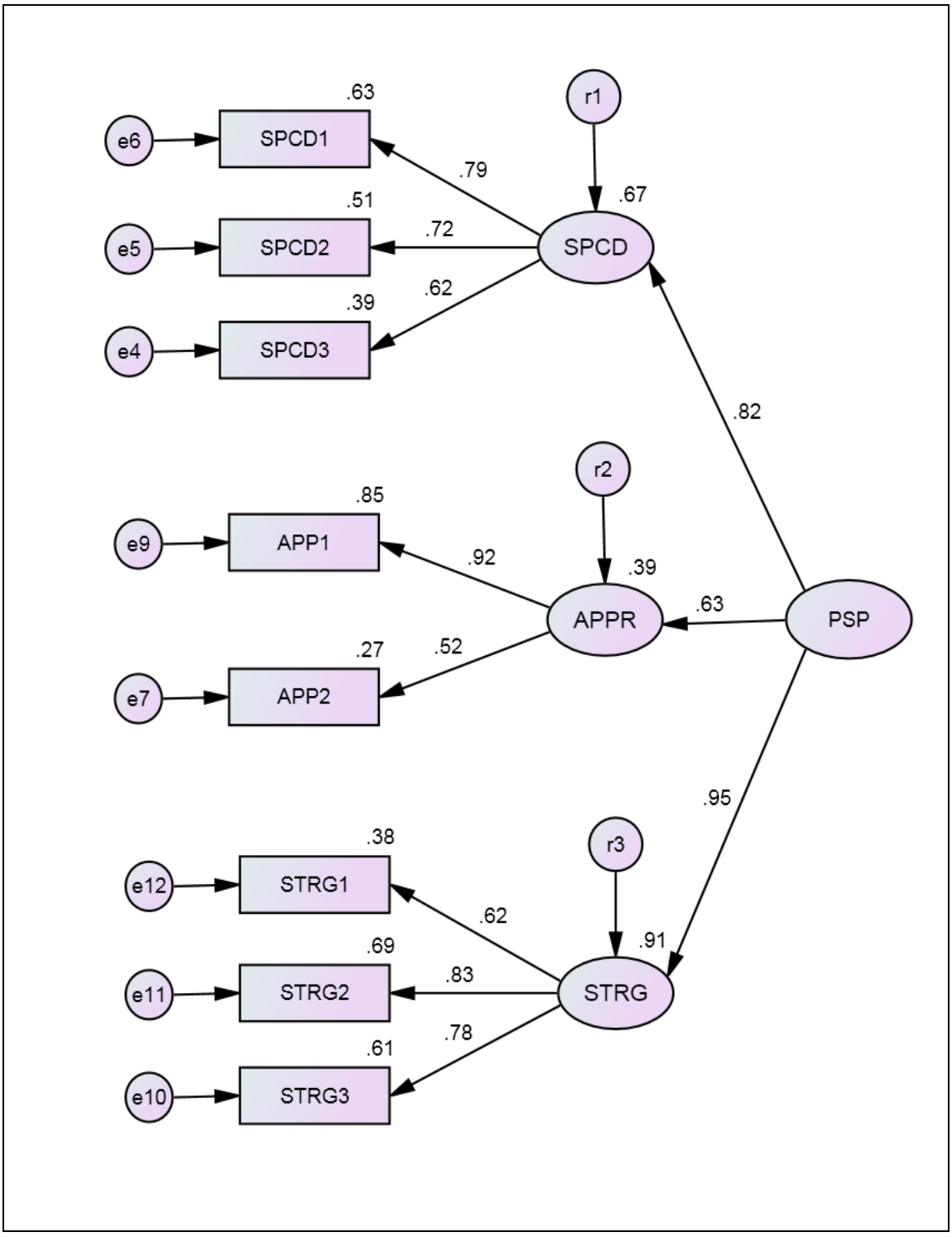


Figure 4.5.3: Second Order Measurement Model for Physical Self Perception

4.9.3 Full Measurement for the hypothesized Model of Exercise Behaviour

After each of the measurement models for each of the related constructs has been validated, these measurement-models are then put together to form an overall measurement model for the hypothesized Model of Exercise Behaviour. Figure 4.6 illustrates the overall model of the hypothesized model of Exercise Behaviour.

As illustrated in Figure 4.6, the Stages of Exercise Change (SEC) were determined using a single-item measure. As explained by Hair, et al. (2006), the major problem with single item measures is that it is underidentified and its loading and error term cannot be estimated. Since it is not possible to test the reliability and validity of a single-item measure, it is left to the researcher's best judgment and best knowledge available to set the measurement parameter associated with the single item (Hair et al., 2006).

Kline (2005) suggests that for a single-item measure, an *a priori* estimate of the proportion of variance of the single indicator due to measurement error is necessary and in accordance with recommendation by Hair et al. (2006) the error variance term should be set (fixed) to one (1) minus the reliability of estimate while the loading estimate (λ relationship) of the single indicator on the construct (SEC) is to be fixed to the square root of the estimated reliability. Since measure for the Stages of Exercise Change (SEC) was adopted from Courneya's (1995) version, therefore in this study, the reliability of the single-item measure was estimated using reliability index obtained from the original source which is .79. Hence the value for the estimated error term was set at .21 (1 – the reliability of estimate) and the factor loading was .89 (square root of the estimated reliability).

As illustrated in Figure 4.7, the overall model of measurement for the hypothesized model for exercise yielded χ^2 value of 815.674 with 410 degrees of

freedom, and $p < .001$ indicating an inadequate fit between the proposed overall measurement model and observed data (the sample data collected). As χ^2 value can be sensitive to sample size and model complexity, other measures of goodness of fit were also employed to determine the fit of the hypothesized model. Alternative measures of goodness of fit however, have indicated that the model represented an adequately fit model (CFI = .960, GFI = .934, SRMR = .0437, and RMSEA = .036). All the fit indices were within the recommended threshold values.

Overall, the fit indices (statistics) suggest that the estimated model reproduced the sample covariances matrix reasonably well and thus provide the support for the overall measurement model.

4.9.4 Assessing the Structural Validity for the hypothesized Model of Exercise Behaviour

The next stage involved testing the structural model after the CFA has validated the measurement model. The structural relationships between constructs were created through two steps specifically**:**

a) All constructs with two headed arrows in the CFA model hypothesized to have "cause-and-effect type of relationships" (Hair, et al., 2006) were replaced with single-headed arrows to indicate the direction of the "cause-and-effect relationships";

b) Two headed arrows connecting constructs that are not hypothesized to have any direct relationship were removed.

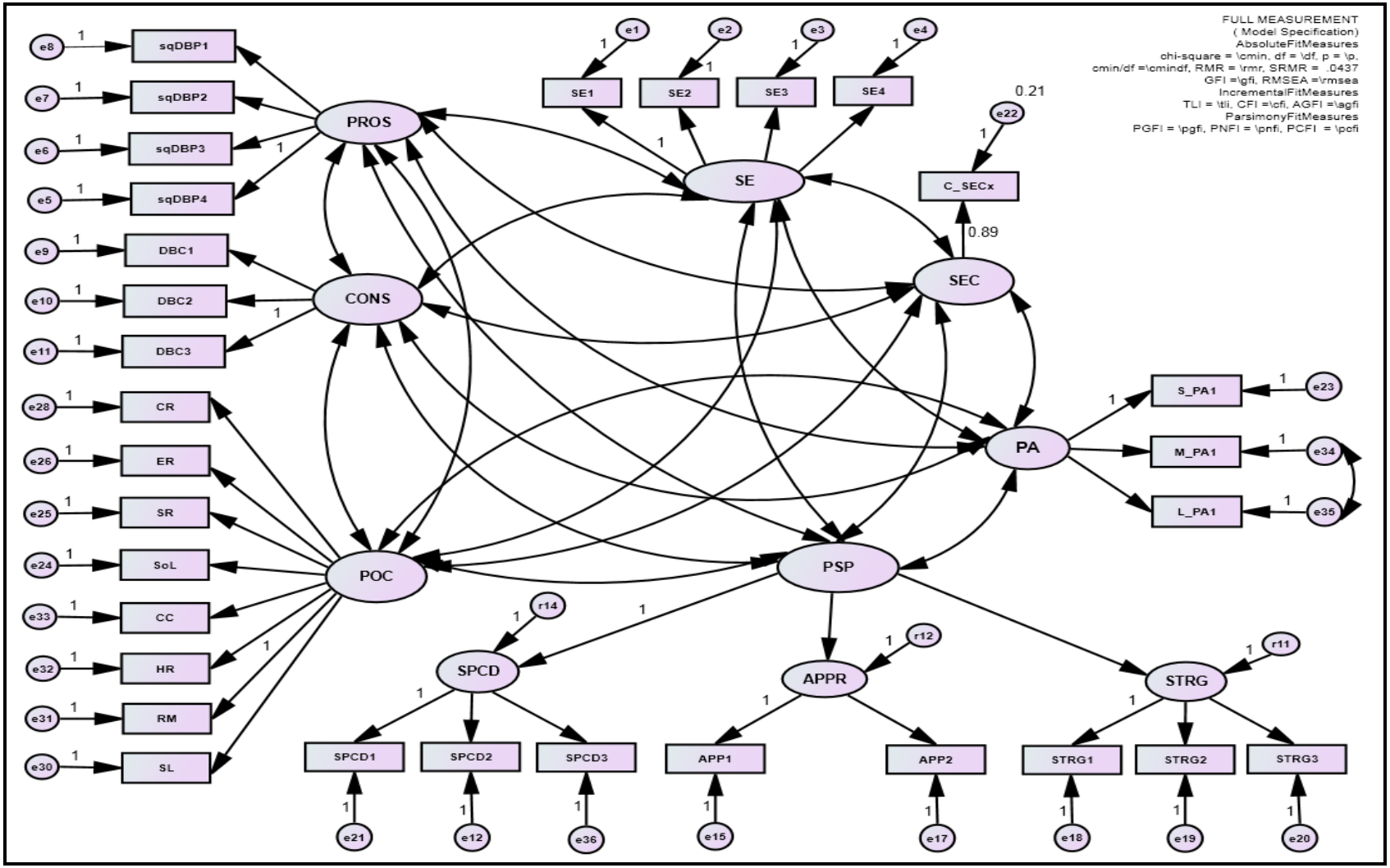


Figure 4.6: Overall CFA Model for hypothesized Model of Exercise Behaviour

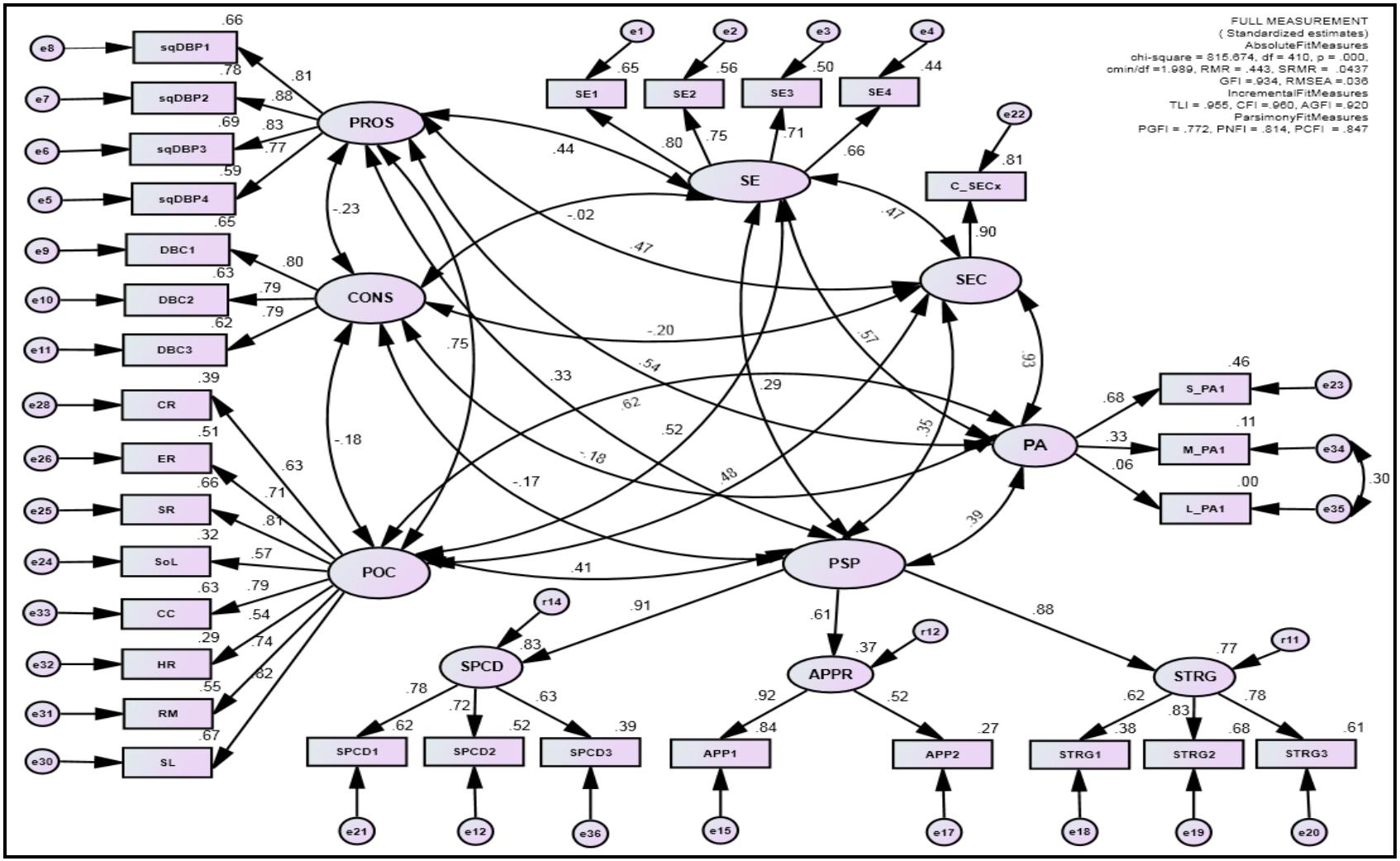


Figure 4.7: Loadings on the Overall Measurement Model for hypothesized Model of Exercise Behaviour

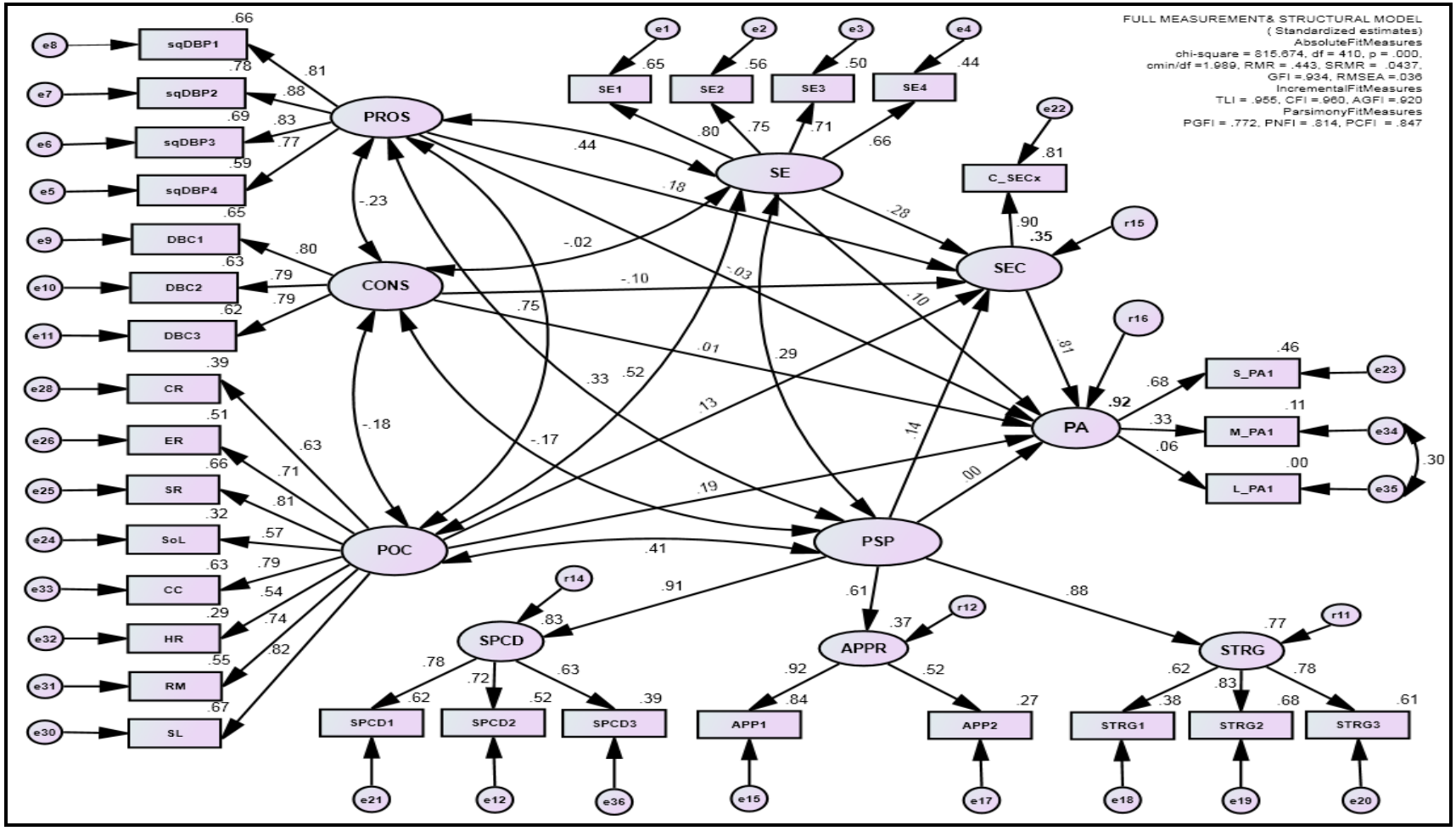


Figure 4.8.1: Overall Measurement and Structural Model for hypothesized Model of Exercise Behaviour (Standardized)

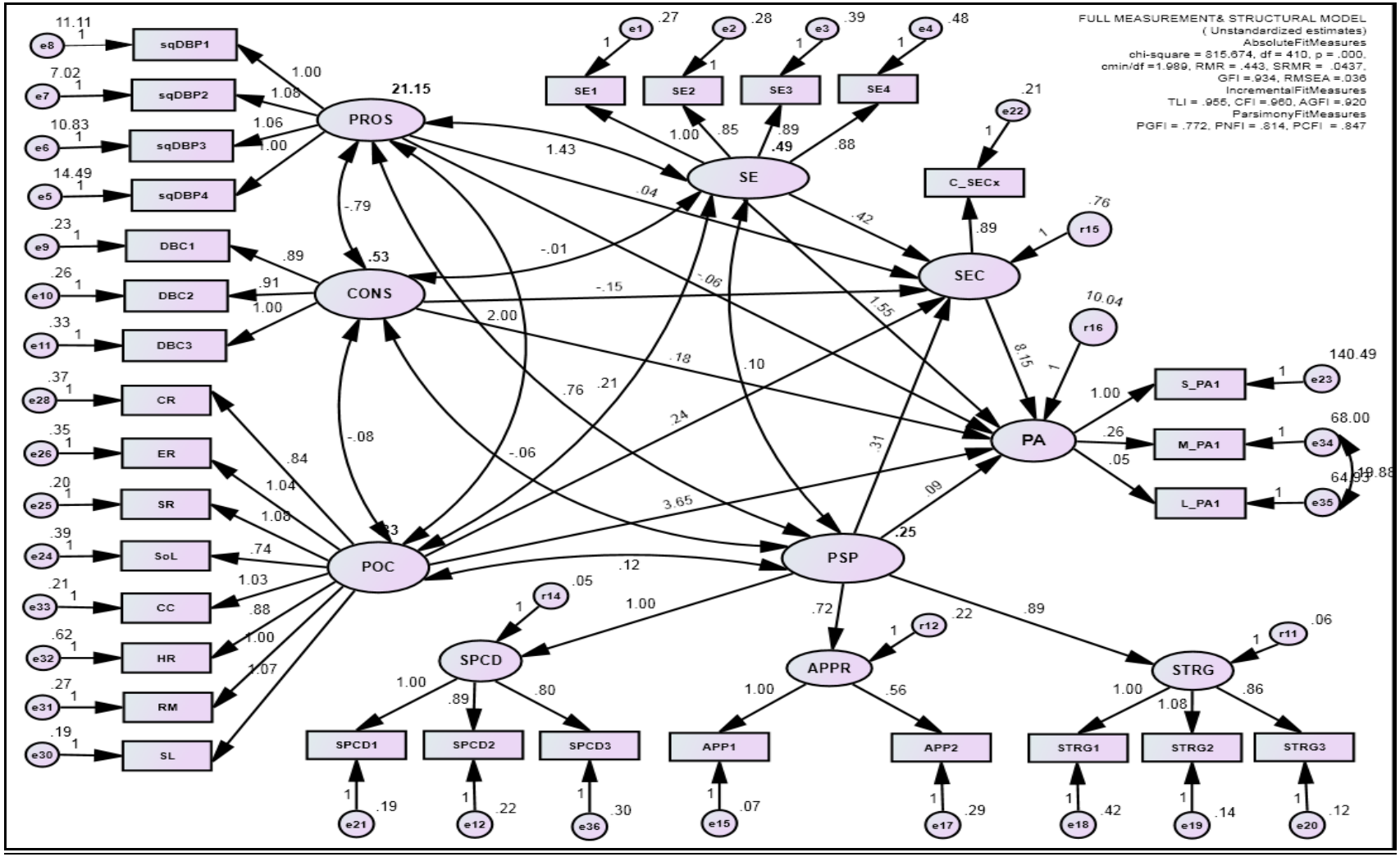


Figure 4.8.2: Overall Measurement and Structural Model for hypothesized Model of Exercise Behaviour (Unstandardized)

The hypothesized structural model (SEM) for exercise displayed in Figure 4.8.1 is considered as a saturated structural model. The chi-square value and other fit indices (χ^2 = 815.674, *df* = 410, and $p < .001$, χ^2/df = 1.989, CFI = .960, GFI = .934, SRMR = .0437 and RMSEA = .036) were all similar when compared with its Measurement (CFA) Model (Figure 4.7). It is expected for a saturated structural model to generate the same fit statistics as those obtained from the measurement (CFA) model since the model specifies "the same numbers of structural relationships as there are possible construct correlations in the CFA" (Hair et al., 2006). According to Hair, et al., a saturated structural model is not very interesting since it can provide no further information than the CFA model. It however, offers researchers a way to detect whether the transition from a measurement (CFA) model to a structural (SEM) model has been correctly performed. If the indices produced are not the same with the CFA model, then a mistake has been made.

The results of the above fit indices indicated that in general, the model adequately fit the data from the sample. Having demonstrated that the hypothesized model had the necessary fit indices, the next step was to determine whether the path coefficients of the hypothesized model were significant and were in the directions as hypothesized.

Hence, based on the theoretical expectations and literature review, the following hypotheses were tested:

H1: The Stages of Exercise Change (SEC) has a positive and significant relationship with the physical activity (PA).

H2: Self-Efficacy (SE) has a positive and significant relationship with the stages of exercise change (SEC).

H3: Self-Efficacy (SE) has a positive and significant relationship with the physical activity (PA).

H4: The Benefits of Exercise (Pros) have a positive relationship with the stages of exercise change (SEC).

H5: The benefit of exercise (Pros) has a positive relationship with the physical activity (PA).

H6: The cost of exercise (Cons) has a negative relationship with the stages of exercise change (SEC).

H7: The cost of exercise (Cons) has a negative relationship with the physical activity (PA).

H8: The Processes of change (POC) has a positive and significant relationship with the stages of exercise change (SEC).

H9: The Processes of change (POC) has a positive and significant relationship with the physical activity (PA).

H10: The Physical Self Perception has a positive and significant relationship with the stages of exercise change (SEC).

H11: The Physical Self Perception has a positive and significant relationship with the physical activity (PA).

Figure 4.9 illustrates visually the hypothesized direct and indirect paths and the direction of the relationships between the constructs of the proposed model of exercise behaviour.

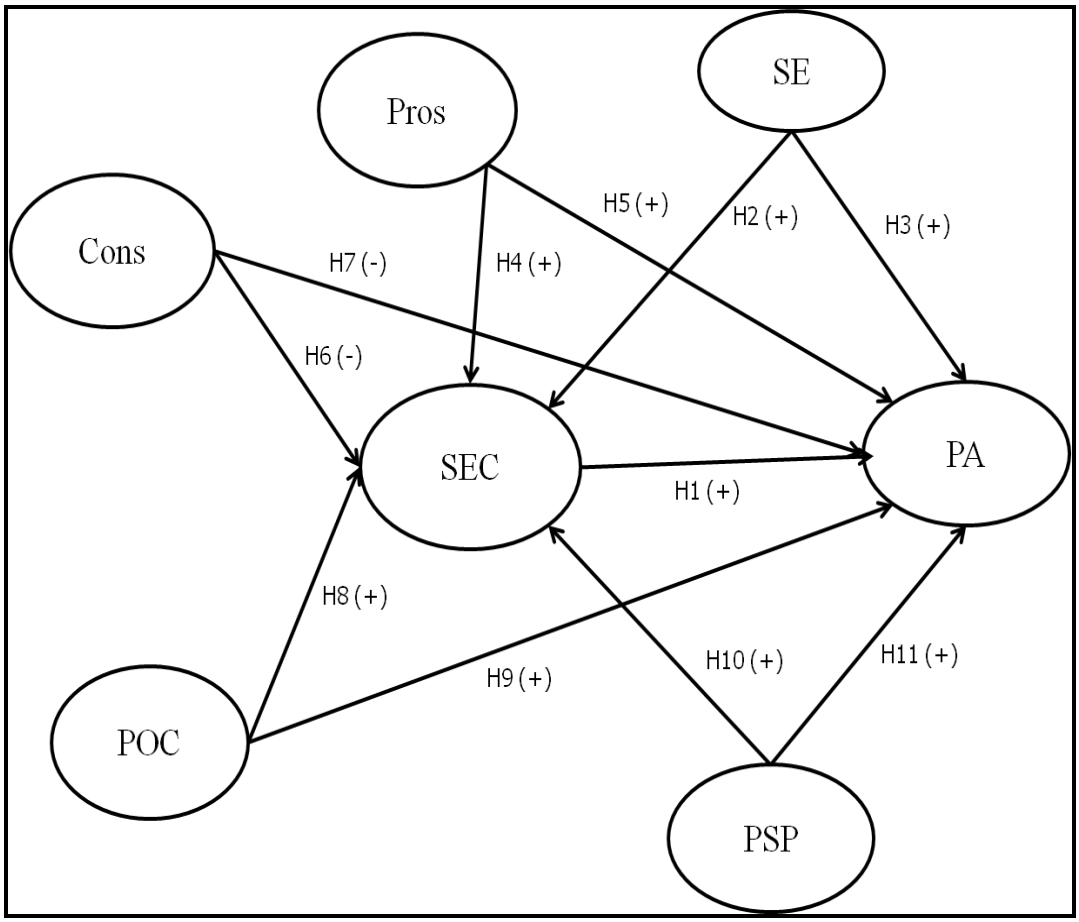


Figure 4.9: The hypothesized direct and indirect paths and the direction of the relationships between the constructs of the proposed model of exercise behaviour.

Note: (+) = positive relationship
(-) = negative relationship

Table 4.22 shows the standardized paths estimates, the critical ratio and significance level of the proposed structural model (Figure 4.9) produced via AMOS 16 programme.

Table 4.22

Standardized Paths Estimates, Critical Ratio and Significance Level of the Proposed Structural Model.

	The hypothesized paths			Standardized estimates	Critical ratio	*p*	Results
H1:	SEC	→	PA	.807	12.676	***	Supported
H2:	SE	→	SEC	.277	5.730	***	Supported
H3:	SE	→	PA	.100	1.678	.093	Not supported
H4:	Pros	→	SEC	.180	2.827	.005	Supported
H5:	Pros	→	PA	-.027	-.355	.722	Not supported
H6:	Cons	→	SEC	-1.04	-2.588	.010	Supported
H7:	Cons	→	PA	.012	.246	.806	Not supported
H8:	POC	→	SEC	.129	1.880	.060	Not supported
H9:	POC	→	PA	.194	2.384	.017	Supported
H10:	PSP	→	SEC	.142	3.148	.002	Supported
H11:	PSP	→	PA	.004	.076	.939	Not supported

*** $p < .001$,

The first group of hypotheses (H1, H3, H5, H7, H9 and H11) converged on the relationships between the Transtheoretical Model constructs with the Physical Activity (PA). Two (2) of the six (6) hypotheses specifically, H1: SEC→PA and H9: POC→PA were supported and its path coefficients were statistically significance and in the hypothesized directions. The other four (4) hypotheses specifically H3: SE→PA, H5: Pros→PA, H7: Cons→PA and H11: PSP→PA however failed to achieve statistical significance and therefore not supported.

The second group of hypotheses (H2, H4, H6, H8 and H10) focused on the relationships between the constructs with the Stages of Exercise Change (SEC). The path coefficients for four (4) of the five (5) hypotheses in this group (H2: SE→SEC, H4: Pros→SEC, H6: Cons→SEC, and H10: PSP→SEC) were statistically significant and in the hypothesized directions (Cons was the only construct with a negative relationship as anticipated, while the other three constructs SE, Pros and PSP were positively related to SEC) and hence were supported. However, one (1) of the structural paths failed to achieve statistical significance. Hence, this hypothesis related to the structural path, namely H8-POC→SEC was not supported.

In order to understand the complex interactions of the various sources of influence on physical activity, all variables were empirically examined for their direct and indirect effects on physical activity.

Table 4.23 displays the Direct and Indirect Effects of the various constructs in explaining the SEC and PA. Several interesting findings can be noted from the results as discussed.

Table 4.23

Direct and Indirect Effects of the various constructs in explaining the SEC and PA

Paths			Direct effects	Indirect effects	Total effects
SE	→	SEC	.277	0	.277
Pros	→	SEC	.180	0	.180
Cons	→	SEC	-.104	0	-.104
POC	→	SEC	.129	0	.129

Table 4.23 (continued)

Paths			Direct effects	Indirect effects	Total effects
PSP	→	SEC	.142	0	.142
SEC	→	PA	.807	0	.807
SE	→	PA	.100	.223	.323
Pros	→	PA	-.027	.145	.118
Cons	→	PA	.012	-.084	-.072
POC	→	PA	.194	.104	.299
PSP	→	PA	.004	.115	.119

a) The relationship of the Stages of Exercise Change in explaining Physical Activity

The path that connect Stages of Exercise Change (SEC) and Physical Activity (PA) has a coefficient value of .807 which was significant at alpha .05 (C.R. = 12.676, p <.001). Hence, it can be concluded that the Stages of Exercise Change (SEC) has a direct positive relationship with the Physical Activity (PA).

b) The relationship of Self-Efficacy in explaining Physical Activity

As shown in Table 4.23, the results illustrate that Self-Efficacy (SE) and Physical Activity (PA) was related indirectly. This is because the indirect effect value (.223) was higher than the direct effect value (.100). The summation of the direct and indirect effect values did not produce a large total effect. In addition, the direct path between Self-Efficacy (SE) and Physical Activity (PA) was not significant at alpha .05 (C.R. = 1.678, p = .093) and hence confirming that the direct relationship between

Self-Efficacy (SE) and Physical Activity was not supported. Correspondingly, Self-Efficacy (SE) impact on Physical Activity (PA) was mediated by the Stages of Exercise Change (SEC) which has a direct positive relationship (.807) with the physical activity (PA).

c) The relationship of Perceived Benefits of Exercise in explaining Physical Activity

Similarly, the results illustrates that Perceived Benefits of Exercise (Pros) was also related indirectly with Physical Activity (PA). The Perceived Benefits of Exercise (Pros) indirect effect value (.145) was higher than the direct effect value (-.027). The size of the direct effect was trivial relative to the strength of the indirect effect. Adding the direct effect value to the indirect effect value produced no increase in total effect value (.118). Hair et al. (2006) advised that small effects (less than 0.08) are seldom of interest and seldom provide substantive explanation. In addition, the direct path between Perceived Benefits of Exercise (Pros) and Physical Activity (PA) was not significant (C.R. = -.355, p = .722) and hence, confirming that the direct relationship between Perceived Benefits of Exercise (Pros) and Physical Activity (PA) should not be considered for explanation. On the contrary**,** Perceived Benefits of Exercise (Pros) indicates an indirect influence on Physical Activity (PA) via the Stages of Exercise Change (SEC) which has a direct relationship with the physical activity.

d) The relationship of Perceived Costs of Exercise in explaining Physical Activity

As for Perceived Costs of Exercise (Cons), the direct effect value was .012 while the indirect effect value was -.084. Totalling up both the direct and indirect effect values did not produce an incremental effect to the total effect value (-.072). Furthermore, the direct path between Perceived Costs of Exercise and Physical Activity was also not

significant (C.R. = .246, p = .806) and hence, confirming that the direct relationship between Perceived Costs of Exercise and Physical Activity was not supported and should not be considered for interpretation. Briefly, although the Perceived Costs of Exercise (Cons) has an indirect influence on Physical Activity, it was a weak, negatively directed and mediated by the Stages of Exercise Change (SEC).

e) The relationship of Physical Self Perception (PSP) in explaining Physical Activity

The relationship between Physical Self Perception (PSP) and Physical Activity (PA) was also related indirectly. The Physical Self Perception (PSP) indirect effect value (.115) was higher than the direct effect value (.004) which proved that the direct relationship between Physical Self Perception (PSP) and Physical Activity was not supported. This is confirmed when the direct path linking Physical Self Perception (PSP) and Physical Activity (PA) was not significant at alpha .05 (C.R. = .076, p = .939). Hence, it affirmed that the influence of Physical Self Perception (PSP) on Physical Activity (PA) was mediated by the Stages of Exercise Change (SEC).

f) The relationship of Processes of Change (POC) in explaining Physical Activity

The effects of Processes of Change (POC) on the other hand, indicated a direct rather than an indirect relationship with Physical Activity (PA). The path that connects Processes of Change (POC) with Physical Activity (PA) produced a coefficient value of .194 which was significant at .05 alpha (C.R. = 2.384, p = .017). It is interesting to note that the Processes of Change is the only constructs examined in this study that indicated a direct rather than an indirect relationship with Physical Activity. The direct effect value (.194) was higher than the indirect effect value (.104) and yielded a total effect of .299. However, the coefficient value for the path linking the Processes of

Change (POC) to the Stages of Exercise Change (SEC) was .129 which was not significant at .05 alpha (C.R. = 1.880, p = .060) and therefore did not support the mediating effects (path) of the Stages of Exercise Change (SEC) on the Physical Activity (PA). Hence, it can be concluded that the Processes of Change (POC) has a direct positive relationship with the Physical Activity (PA).

4.9.4 Assessing the Structural Validity for the Respecified Model of Exercise Behaviour

In the interest of parsimony, the model of Exercise Behaviour was reestimated without these non-significant paths. Table 4.24 displays the standardized paths estimates, Critical Ratio and Significance Level of the respecified structural model of Exercise Behaviour.

Table 4.24

Standardized Paths Estimates, Critical Ratio and Significance Level of the Respecified Structural Model.

	The hypothesized paths			Standardized estimates	Critical ratio	*p*	Results
H1:	SEC	→	PA	.835	15.150	***	Supported
H9:	POC	→	PA	.223	4.381	***	Supported
H2:	SE	→	SEC	.316	6.947	***	Supported
H4:	Pros	→	SEC	.257	5.676	***	Supported
H6:	Cons	→	SEC	-.101	-2.548	.011	Supported
H10:	PSP	→	SEC	.163	3.769	***	Supported

*** $p < .001$,

The reestimation of the model resulted in an overall χ^2 value of 822.334, *df* = 415, and $p < .001$. There was slight erosion in model fit from $\chi^2 = 815.674$ for the original model to $\chi^2 = 822.334$ for the respecified model. However the χ^2 difference between the two models was not significant ($\Delta\chi^2_{(5)} = 6.66$). The other fit indices of interest (CFI = .960, GFI = .934, SRMR = .0438 and RMSEA = .036) also remained virtually unchanged from the earlier model. Hair et al. (2006) affirm that "… a structural model demonstrating an insignificant $\Delta\chi^2$ value with its CFA model is strongly suggestive of adequate structural fit" (p. 858). In addition, as shown in Table 4.24, all paths relating to the latent variables in the respecified model were all significant at $p < .05$. Figure 4.10 displayed the structural model that has been respecified without the non-significant paths.

Hence, it is concluded that the structural model schematically portrayed in Figure 4.10 represents an adequate model for the description of the exercise behaviour among the teacher trainees in Malaysia.

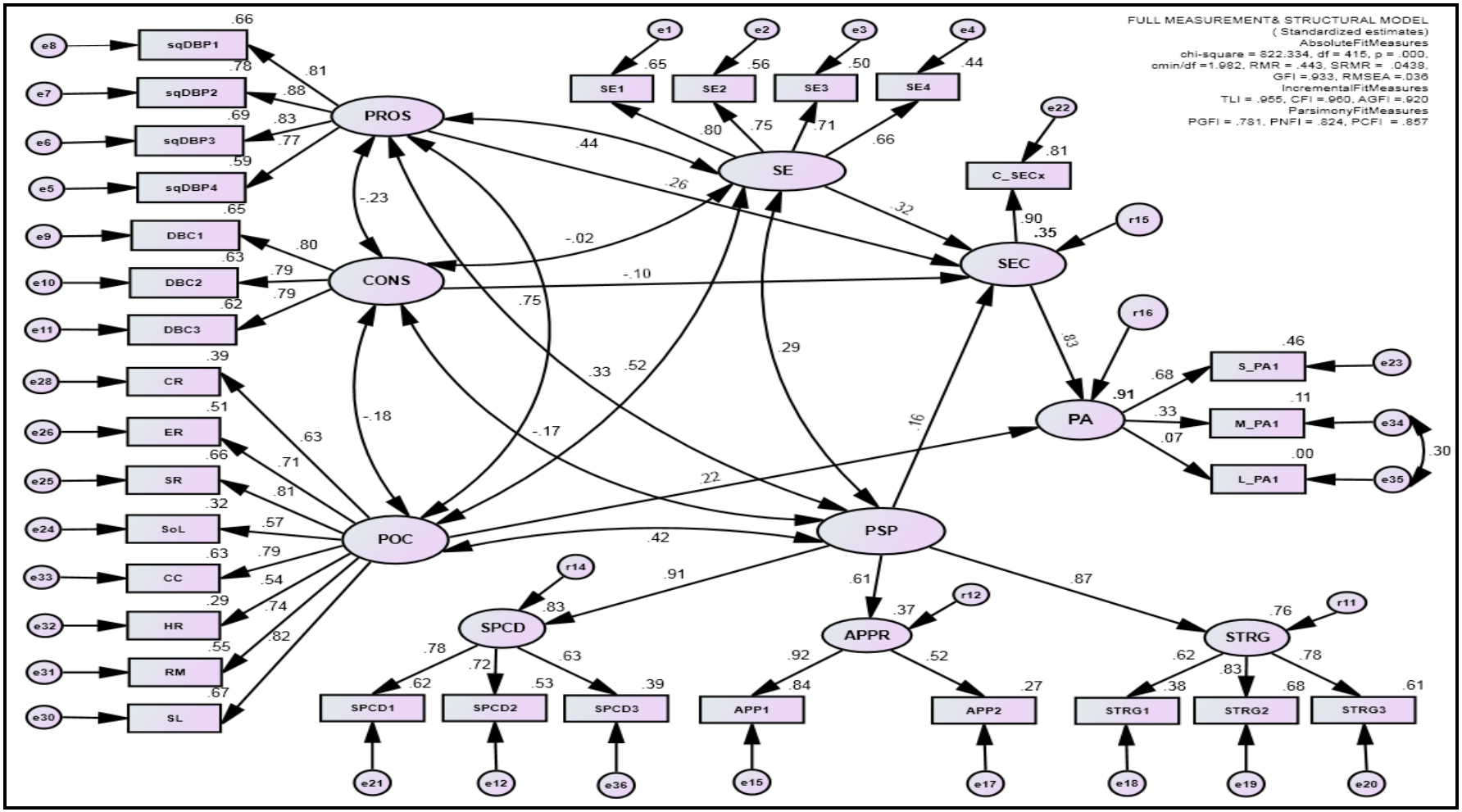


Figure 4.10: Revised Structural Model for hypothesized Model of Exercise Behaviour (Standardized)

4.10 Summary of Results

As a summary, based on the data analysis presented in this Chapter 4, the following results were noted:-

1. The physical activity status of the participants as measured using the Godin's Leisure Time Physical Activity Questionnaire (GLTEQ) revealed that overall, slightly over a third (34.4%) of the participants were actively participating in sweat inducing physical activity, while slightly more than half (56.4%) of the participants were moderately active in sweat-inducing activity and only 9.3% of the participants indicated that they were not active in sweat-inducing physical activity.

2. When the participants' physical activity status was verified using their weekly leisure-time exercise scores, the results indicated that there was significant difference between the three groups of participants. The active group had significantly higher weekly leisure-time exercise score (METs) compared to both moderately active and non-active groups. The moderately active group of participants also showed significantly higher weekly leisure-time exercise score than the non-active group.

3. The male participants (teacher trainees) were significantly more actively engaged in sweat-inducing physical activity compared to female participants. In addition, more female teacher trainees reported that they seldom or never participated in physical activity compared to their male counterparts. Consequently, male participants have higher weekly leisure-time exercise score compared to the female participants.

4. Although there was no significant difference with regard to the physical activity status among the respondents by their age-groups, the younger age group participants have higher weekly leisure-time exercise scores across their age groups.

5. In terms of ethnicity, the Malay participants were more actively participating in sweating inducing physical activity and had significant higher weekly leisure-time exercise scores compared to the Chinese but not significantly different with the Indians.

6. From the perspective of their stages of exercise change, more male participants were found to be in the later stages of exercise change than their female counterpart. Across races, more Indians were found in the later stages of exercise, followed by Malays and then the Chinese. Conversely, more Chinese were found in the earlier stages of exercise of exercise followed by the Indians and the Malays respectively.

7. The male participants were found to have significantly higher self-efficacy scores than the female participants, while the youngest age group of participants indicated that they have significantly higher self-efficacy than the older age group. In terms of ethnicity, the Indians had significantly higher self-efficacy than the Chinese but not significantly different with the Malays participants.

8. The male participants demonstrated that their perceived Benefits of Exercise (Pros) were higher when compared with the female participants while no significant difference was found among the age groups. However, in terms of ethnicity, the Chinese participants demonstrated significantly lower perceived Benefits of Exercise (Pros) from the Indians and the Malays participants. There was however no significant difference between the Indian and Malay participants in their perceived Benefits of Exercise (Pros).

9. On the other hand, the female participants indicated that their perceived Costs for Exercise (Cons) were higher than the male participants. In terms of their age-groups, there was no significant difference in term of their perceived Costs for Exercise

(Cons). Nevertheless, the Chinese demonstrated that they have higher perception of costs or barriers for exercise than the Malays and the Indians respectively.

10. In terms of the participants' (teacher trainees) use of processes of change, the male participants indicated that they used significantly more in both the cognitive (covert) processes and behavioural (overt) processes of change than their female counterparts. In terms of their age groups, there was no significant difference in the type of processes of change used. However, from the standpoint of ethnicity, the Chinese participants used significantly less in both the cognitive (covert) processes as well as the behavioural (overt) processes of change while there was no difference in the processes of change between the Indians and the Malays.

11. The weekly leisure-time exercise scores, the Perceived Benefits of Exercise (Pros), The Cognitive Processes of change, and the Behavioural Processes of change were found to be significantly difference across the stage of exercise. Conversely, there were no significant differences in the self-efficacy and the Physical Self Perceptions of the participants between those in the lowest (pre-contemplation/contemplation) stage with participants in the middle stage (Preparation). However there were significant differences between those in the lower stages of exercise (pre-contemplation/contemplation) with participants who were in the later stages (action/maintenance) their self-efficacy and the Physical Self Perceptions.

12. The results of this study demonstrated that Self-Efficacy, Perceived Benefits of Exercise, Perceived Costs of Exercise, and Physical Self Perceptions influenced Physical Activity indirectly and were being mediated by the Stages of Exercise which was directly correlated with Physical Activity. The only construct that influenced Physical Activity directly was the Processes of Change for Exercise.

CHAPTER 5

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This study is based on the proposition derived from the Transtheoretical Model, that individuals who desire to be active physically move through a series of stages usually in a cyclical manner in one's effort to change the desired behaviour (Marcus & Forsyth, 2003a) and these stages of motivational readiness for change is greatly influenced by the psychological variables of self-efficacy, decisional balance and processes of change in exercise. Besides this, the physical self-perception of an individual is also hypothesized to influence the stages of change.

Hence, the purpose of the present study is to examine the characteristics associated with the different stages of exercise behaviour change among the teacher trainees in Malaysia. Specifically, this study seeks to determine the proportion of the Malaysian teacher trainees in each of the five stages of exercise, the differences in their self-efficacy, their decisional balance and their processes of change across the stages of exercise behaviour, and to identify the relationship between these psychological variables and their exercise behaviour.

This chapter presents a discussion of the findings and conclusions based on the results and seeks to offer some recommendations for future research. The first section of this chapter discusses the findings in this study with respect to the research questions established earlier. This is followed by discussion on the implications for educational practice and then the recommendations for future studies.

5.1 Discussions

The focus of the present study was to examine the exercise behaviour among a sample of teacher trainees in Malaysia. Several research questions were formulated and served as guidelines to carry out this study. Hence, in order to facilitate discussions systematically, the discussions section of this study is organized in sequential order in accordance with the research questions presented in this study.

Research Question 1: What are the physical activity levels of the Malaysian teacher trainees in relation to the following demographic variables: gender, age and ethnicity?

As indicated in previous studies it was argued that demographic variables such as gender, age and ethnicity can greatly influence one**'s** physical activity status (Keating et al., 2005). For example, physical activity level has been found to decline with age. Bouchard, Blair and Haskell (2007) reported that physical activity levels are at their peak in childhood and start to decrease throughout the adolescence and into old age. Comparatively, younger individuals will have higher leisure-time physical activity levels through their involvement in more vigorous physical activities than older people.

In this study however, no significant differences were found among the age groups in their frequencies for leisure-time physical activity. At a glance, this result may imply that it did not support the findings of previous studies, but on the other hand, it is possible that this result merely indicates that the participants were actually quite homogeneous in term of their age. This is evident as the age of participants in this study ranged between 17 to 25 years old that was not a big variation and hence it is possible that it did not represent a very wide differentiation spread to capture their differences in their physical activity levels.

However, the participants in this study had demonstrated that there were differences in terms of the vigorous levels or dynamicity of their physical activity

among the different age groups. This is evident in the significant differences detected in their weekly leisure time exercise scores measured in METS among the four different age groups. In other words, the two youngest age groups although did not show any significant difference between themselves, they were significantly higher in their weekly leisure-time exercise score (METs) compared to the two older age groups. As the weekly leisure-time exercise score (WLTEQ) developed by Godin & Shephard (1985) is derived by summing the reported weekly frequency of participation at the three intensity levels multiplied by the corresponding anticipated value (9, 7, and 3 METS) it therefore reflects the vigorous level of a person's engagement in the physical activity. Hence, although the findings of this study showed that there was no age related difference in the frequencies of leisure-time physical activity participation, it somehow provided some empirical evidence that individuals have a tendency to engage in less vigorous physical activity as they advance in age as illustrated by the participants in this current study.

The present findings regarding the decline in physical activity with age can also be explained in that the participants in this current study are teacher trainees and technically, they are still being classified as students. As such, as they progress through their five and a half years teacher training programme these older teacher trainees are likely to have lesser time to participate in physical activity partly due to the increasing coursework and the substantial increase of anxiety to complete their training programme may have contributed to the decline in physical activity participation.

Additionally, there is clear evidence to suggest that gender related differences in physical activity persist throughout the lifetime. Generally, males have consistently been found to be more active physically than females and they have a propensity to engage in a more dynamic type of physical activities (Talbot, Metter, & Fleg, 2000). Therefore, it is not surprising to note that the findings from the current study were

consistent with the previous. The male teacher trainees were significantly more actively engaging in sweat-inducing physical activity compared to their female counterparts. In short, more female teacher trainees reported that they seldom or never participate in physical activity compared to their male counterparts. In addition, male participants also indicated that they have significantly higher weekly leisure-time exercise scores compared to the female participants suggesting that besides being more actively engaged in leisure-time physical activity in terms of frequency, the male participants also have higher levels of physical activity through their involvement in more vigorous physical activities than their female coursemates.

Several hypotheses have been suggested to explain the observed gender differences in physical activity levels in past studies. Tan (1991) for example, pointed out that in the Malaysian context, while the males are encouraged to be active, expressive, and strong, the females are expected to be passive, soft-spoken, and self-effacing, which is apparent as a part of the Malaysian culture. Therefore, it could be viewed as violating this expectation for females to engage in vigorous physical activity. In addition, Carrol (1993) reported that both religion and cultural factors may act as a powerful force to restrict the participation rates of females in physical activity. On the contrary, it is worth noting that an earlier study by Kee, Ong and Wee (2010) on exercise behaviour among a younger group of students (secondary schools students) discovered that female students were more active than their male counterparts. Their finding does not seem to be consistent with the finding of the current study and the rationale presented to explain the gender related variations in physical activity levels. However, this finding may indicate that at a younger age, female participants may encounter lesser religion and cultural constraints and lesser expectations from the society to follow the expected social norms and therefore they are freer to engage in

vigorous physical activity. This freedom has, however, quickly been restricted as they grow older.

Ethnicity may also play a role in explaining the variation in physical activity levels. It is clear in a study conducted by the Centre for Disease Control and Prevention (U.S. Department of Health and Human Services, 2000) which found discrepancies in the percentage of sedentary lifestyle among the ethnic groups with 54% from the Hispanic Americans, 52% African American, 46% American Indians, 42% Pacific Islanders and 36% from the White Americans. Back home in Malaysia, an epidemiological study conducted by the National Health Morbidity Survey III (2006) revealed that there were differences in the prevalence of physical activity across ethnicity. Among the ethnic groups, non-Malay Bumiputera was most active physically with 16.9% reported to have exercised during leisure time followed by the Malay Bumiputera (15%) and the Indians (13.3%). The Chinese was found to be the most physically inactive ethnic group with only 12% reported exercising during leisure time.

The findings of the current studies were consistent with previous studies from both local and abroad scenarios and this has provided further support for the ethnicity related differences in the physical activity levels. In this study, the Malay participants were more actively participating in sweat inducing physical activity and have indicated significantly higher weekly leisure-time exercise scores compared to the Chinese. However, they were not significantly different from their Indian counterparts. Some of the reasons put forward to explain the ethnicity related variation in physical activity levels include cultural and religious factors, accessibility to recreational resources and socioeconomic status across ethnic groups (Bouchard et al., 2007).

In Malaysia and many other parts of the world particularly in the Asian region, the most plausible reasons for the ethnicity related differences in the physical activity levels may be due to cultural and religious factors. For example, Callaghan et al. (2002)

have shown that among the Asians particularly people of the Chinese origin were consistently found to have lower level of exercise than their fellow citizens of other origins. One possible reason cited by Callaghan et al. is that culturally the Chinese is renowned for being industrious and hence they might have viewed exercise as play and thus considered exercising as less important. They prioritised work and books and for that reason they participate less in physical activities. Flath (2005) claimed that it is the Chinese culture to promote intellectual learning and therefore put less emphasis on physical activities.

Research Question 2: What are the stages of exercise change of the Malaysian teacher trainees in relation to the following demographic variables: gender, age and ethnicity?

The stages of change model hypothesizes that a person moves through a series of stages usually in a cyclical manner in his effort to change behaviour (Reed, 1999). Marcus and Forsyth (2003) viewed it as the stages of motivational readiness for change to indicate that this model include both the motivational and actual behavioural change. There are five stages of readiness for change for exercising, specifically Stage 1: Pre-contemplation stage where individuals are not doing any physical activity and have no plans to get active physically in the near future; Stage 2: Contemplation stage where individuals are inactive in physical activity but are thinking about getting active physically; Stage 3: Preparation stage where individuals are engaging in physical activity but not at the recommended levels to benefit from it; Stage 4: Action stage where individuals are doing enough of the recommended amount of physical activity but not long enough (the duration has been operationalized in this study to a period of at least over six months) and the final stage, Stage 5: Maintenance stage where individuals have been doing enough of the recommended amount of physical activity at least over six months and have turned the physical activity into a habit.

In this study however, due to the existence of a small number of participants classified in some of the stages, decision had been taken to reclassify these five stages of exercise behaviour by merging them to form only three stages to facilitate analysis and interpretations of the results. Furthermore, as suggested by Markus and Simkin (1993) the stages of change model should be able to discriminate the participants from the different stages of their exercise behaviour. In other words, participants in their different stages of exercise should be able to report the differences in the time spent or intensity level of their physical activity. However as pointed out by Marcus et al. (1992c) participants in precontemplation and contemplation stages differ only in terms of their intention to exercise (Pre-contemplation – no plan to start exercise versus Contemplation – have plan to exercise and in both stages the participants are not engaging in physical activity) whilst the participants in Action and Maintenance differ on the duration of their current involvement in the regular exercise (Action - less than six months involvement in the regular exercise versus Maintenance - six or more months involvement in the regular exercise) and hence, they would not be able to report differences in the time spent in physical activity. In fact Bucksch, Finne, and Kolip (2008) suggested that it might be more practical to differentiate between individuals who have no intention to include physical activity in their daily life, with individuals who are ready to change or who have changed their behaviour recently and with individuals that have adhered to physical activity for a significant period of time. Therefore, in following the recommendation by Bucksch, Finne, and Kolip, it is justifiable to reclassify the five stages into the three stages that can reflect the participants' stages of exercise behaviour better. These three reclassified stages were Pre-contemplation/Contemplation Stage (inactive in physical activity), Preparation Stage (engaging in physical activity but not regular enough) and Action/Maintenance Stage (active engaging in physical activity).

On the whole, about 36.6% (n = 276) of the participants were in the Action/Maintenance Stage (actively engaging in physical activity), while 49.3% (n = 372) belonged to the Preparation Stage (irregularly active in physical activity) and another 14.0% (n = 106) of the participants were reported to be in Pre-contemplation or Contemplation Stage (inactive physically).

The percentage of participants (teacher trainees) who reported to be "active" (36.6%) in this study was however, much lower than studies reported in other countries, namely 44.3% for British students (Wyse et al., 1995), 44.2% for the New Zealand adolescents (Prapavessis et al., 2004), 45.5% for Korean teenagers (Kim, 2004), and 65% for Canadian High Schools students (Nigg & Courneya, 1998). Consequently, these observed and reported differences could suggest that Malaysian young adults are generally less active than their counterparts from other regions. This should be a cause of concern to the authority and therefore warrants further investigation on this matter. It is therefore imperative that appropriate actions be taken by the relevant authorities to address this unhealthy practice/situation in Malaysia.

On the other hand, it is interesting to note that based on the measures of the stages of exercise behaviour, that is from the 14.0% (n = 106) of the participants who have classified themselves to be in Pre-contemplation or Contemplation Stage (inactive physically), only 1.7% (n = 13) of the participants were actually from to the Pre-contemplation Stage, the stage that characterized by individuals who have no desire to change their current sedentary lifestyle or have planned to start exercising in the next six months or so. This would mean that the rest of the participants (12.3%) who were not exercising then, were in the Contemplation Stage representing individuals who were aware of the need for them to exercise but who have yet to make a commitment to change their exercise behaviour. One of the possible reasons for their hesitation to take action to change their behaviour (to exercise) might be due to their perceived Costs of

Exercise. While they (contemplators) are able to recognize the benefits in changing for the desired behaviour, they are also aware of the costs or the negative aspects of changing their exercising behaviour. The decisional balance results in this study provide further evidence that participants at different stages have different views on both the positive and negative aspects of exercise participation. The participants in the Pre-contemplation/Contemplation Stage revealed that they have higher negative perceptions (Cons) of exercising compared to participants who are in the Action/Maintenance Stage. On the contrary, they exhibited lower positive perceptions (benefits) of exercising compared to the participants who are in the action/maintenance stage. This observation is congruent with the reports of past studies. Therefore, actions or strategies that help individuals to reduce their negative perceptions towards physical activity will most likely inspire individuals especially in the earlier stages in moving through the stages of change in exercising. Furthermore, with the continuing efforts in highlighting the wide spectrum benefits of physical activity to these individuals through various strategies such as building their self-confidence through physical activity involvement it is believed that this will help to enhance their positive perception towards physical activity involvement.

Researchers have also regularly found that physical activity behaviour increase across these stages of change. Past studies have shown that demographic variables such as gender, age and ethnicity have an influence on the individuals' physical activity status across these stages of exercise change (Bouchard et al., 2007).

However, in this study, the prevalence of the stages of exercise change did not reveal any significant variation among the four age groups. As mentioned earlier, one of the possible reasons for the insignificant difference result might be due to the narrow distribution in the age range of the participants. The age range for the participants was only eight (maximum age = 25 and minimum age = 17) which was too narrow a gap to

extract any variation among them in relation to their stages of exercise (Heather et al., 2002).

In contrast, there were gender differences in the prevalence of the stages of exercise change. More male participants (teacher trainees) were found to be in the later (action/maintenance) stages than the female participants. The significant difference in exercise behaviour distribution between the gender was consistent with past studies (Kim, 2004; Wyse et al., 1995). The rationale why more male participants were more likely found in the higher stages of exercise change could most probably be due to the fact that male participants were more actively engaging in leisure-time physical activity in terms of frequency and secondly, the male participants were also more dynamic in their involvement in more vigorous physical activity than the female counterparts. In addition, female participants were found to have not only lower self-efficacy for exercise but also higher perceived costs or barriers for physical activity.

Among the three major races, the Indians were more likely to be in the higher stages of exercise. This was followed by the Malays and then Chinese. Conversely, the Chinese were more likely to be placed in the lower stages of exercise, followed by the Indians and Malays respectively. Results from this study indicated that within the Chinese ethnicity, 25.9% of the Chinese teacher trainees were categorized under the Pre-contemplation/ Contemplation Stage (inactive group) while only 11.4% came from the Malay teacher trainees and 16.7% from the Indian ethnic group. The differences in the stages of exercise behaviour among the ethnic groups were in agreement with their physical activity levels. These findings clearly support the report provided by the National Health Morbidity Survey (2006) which reported that Chinese was the most physically inactive ethnic group. As discussed earlier, Callaghan et al. (2002) in their study on young Hong Kong Chinese, revealed that the Chinese were consistently lower in their exercise level when compared with their counterparts in other countries. These

two studies may shed light as to why Asians, particularly the Chinese are less actively engaging in regular exercise compared to their counterparts in other regions of the world. As suggested by Callaghan et al., exercise is often seen as play and thus is considered less important than studying hard among the Chinese in its community. Hence, physical activity has been given a low priority over intellectual learning. In relation to the current study, these teacher trainees are still technically categorized as students who need to study hard in order to graduate from the teacher training programme they have enrolled in. With a strong cultural background, it is not surprising to find the Chinese teacher trainees being influenced by the culture and belief of their community. Based on this premise and observations of this study, it is suggested that any effort to improve the physical activity levels of students in schools or among young adults at large might be more successful if the relevant authorities could approach the issue by taking into consideration of the students' cultural background.

Research Question 3: What are the differences in psychological variables in terms of (a) self-efficacy, (b) decisional balance (c) processes of change, and (d) physical self-perception profile among the Malaysian teacher trainees in relation to the following demographic variables: gender, age and ethnicity?

a) Self-Efficacy

Self-efficacy is one's perceived confidence in the ability to accomplish a specific behaviour and that the level of confidence to engage in a specific behaviour is significantly associated to the actual behaviour (Kim, 2004; Kim, Cardinal, & Lee, 2006a) which in the context of the current study is to perform physical activity during leisure time. In this study, the male participants were found to have significantly higher self-efficacy scores than the female participants. As the level of confidence to engage in a specific behaviour is significantly related to the actual behaviour (Marcus et al., 1994),

thus the differences between genders suggest that females have less confidence than males on their capability to engage in physical activity. In other words, males are able to demonstrate a high level of confidence probably due to their higher level of willingness to exercise, and their enthusiasm to actually embark on a greater amount of physical activity. Past studies have suggested that boys and men generally have higher self-confidence level than the girls and women in competitive or comparative situations such as in sport setting (Lenny, 1977). It is believed that one of the many reasons why girls and women lack the confidence is that girls and women do not engage enough in sport or physical activity. On top of that, there was also the lack of sport opportunities for girls to indulge in as compared to the boys (Feltz, Short, & Sullivan, 2008). In spite of this, Lenny (1977) revealed that while females were no different from the males in terms of confidence level when performing tasks that were "gender neutral" it somehow indicated that gender differences would be observed when both genders were placed in competitive situations. According to Lirgg, George, Chase, and Ferguson (1996) females indicated that they were more confident on feminine-type of activities than on the masculine-type of activities. In contrast, males efficacy levels were not influenced by gender-oriented tasks and males tend to take task for granted thinking that if the task could be performed by the females it could also be easily executed by them. In a more recent study by Solmon, Lee, Belcher, Harrison, and Wells (2003), it was demonstrated that males have better efficiency in learning ice hockey but females who perceived the activity to be gender neutral were more confident in their ability to learn ice hockey than females who believed that ice hockey was a male sport.

Another explanation for the gender differences in self-efficacy is that females have fewer experiences in competitions and therefore are more adept at performing physical activities of lower levels. This may not be an unfounded reason as both religion and cultural factors can act as a powerful force to restrict the participation rates of

females in physical activity (Carrol, 1993). Again, as claimed by Tan (1991) the Malaysian culture expect the males to be active, expressive, and strong, while the females are expected to be passive, soft-spoken, and self-effacing. As a result, females are not encouraged to engage in vigorous physical activity which is regarded as a masculine type of activity.

The results of current study also revealed that the youngest age group of participants indicated that they have significantly higher self-efficacy than the older age group. This is not an unexpected finding as individuals who are active in physical activity have been consistently linked with their high exercise self-efficacy. However, what is unclear is why the older teacher trainees have lower self-efficacy for exercise? One possible explanation for this may be linked to the seniority status of the trainees (participants). In the context of the current study, the age of the teacher trainees was also an indication of the trainees' seniority status in the teacher training programme (five and a half years programme). In brief, trainees who are near completion of the programme are also older in age than trainees who are at the early stage of the programme. As self-efficacy is situation-specific (Kim, 2007) and may fluctuate in relation to personal circumstances such as getting ill or changing of schedule, it is highly possible that with increasing academic workloads as the trainees progress through the programme and also their anxiety to complete the course on time, trainees at the later stage of their teacher training (older age group) were time pressed and thus have lesser time for leisure activities including exercising. This may have contributed and provided the explanation for the lower self-efficacy for exercise among the older age group of trainees in comparison with the younger age group of trainees.

From the ethnicity perspective, Chinese participants have revealed that they were significantly lower in self-efficacy compared to the Indian and the Malay counterparts. This finding was also expected as past epidemiological studies have

revealed that self-efficacy has been strongly related to one's intention to exercise behaviour (Marcus et al., 1994) and that ethnic differences do exist for physical activity behaviour (Suminski & Petosa, 2002). This view may be congruent with the views advocated by the researchers in the Centres for Disease Control and Prevention (U.S. Department of Health and Human Services, 2000). In this context, the researchers have found variations in the sedentary levels among the adults of numerous ethnic groups and these ethnic differences were distinct even at the high school level. As self-efficacy is assumed to influence choice, effort, thought and behavioural performance (Prochaska & Marcus, 1994), the various ethnic groups who possess different degrees of exercise-specific self-efficacy may be due to the different levels of attraction experienced by the different ethnic groups. For instance, the Malays and the Indians trainees may have perceived exercising as a good platform for socializing and de-stressing while the Chinese as mentioned earlier may not possess the same efficacy beliefs as the other ethnic groups. Instead, they viewed exercising as play and thus gave it a low priority. In explaining this argument, Kirsch (1982,1995 cited in Feltz et al., 2008) suggested that self-efficacy expectations may be more reflective of one's willingness to perform certain task than one's confidence and that fear may give rise to anxiety drive that could motivate subsequent avoidance behaviour and leave one with low levels of efficacy beliefs. To cite an example in this study, this would mean that the Chinese trainees were actually worried of not doing well in their academic performance and hence they were not willing to compromise their time for exercising over their academic priority and this avoidance behaviour has manifested in the low self-efficacy for exercising.

An individual must also believe that by being physically active, positive outcomes or outcome expectations such as reduction in body weight, fitter physique or reduction in cholesterol will ensue (Marcus & Forsyth, 2003b). Such positive outcomes

must also outweigh any negative outcomes (e.g. physical discomfort while exercising, taking up too much time while exercising, missing out on the opportunity to be with family members etc.) that might also be experienced by the individual. Consequently, this leads to the next important determinant of physical activity which is the process of decision making towards the commitment in physical activity. This process also known as the Decisional Balance is the process of how an individual weighs the gains against the losses that will be experienced because of behavioural change in physical activity.

b) Decisional Balance

Marcus et al. (1994) described decisional balance which was first conceptualized by Janis and Mann (2005) as the motivational and cognitive components of decision making to assess the potential benefits (Pros) and costs (Cons) of engaging in a behaviour which in the current context is to exercise or engage in physical activity. It is hypothesized that an individual is not expected to change or to continue in an activity unless the "balance sheet" indicate the gains exceeded the losses (Gorely & Gordon, 1995).

The male participants in this study demonstrated that they have higher positive perception (benefits) towards exercise when compared with the female participants while no significant difference in perceived benefits of exercise was found in relation to their age groups. However, in terms of ethnicity, the Chinese were significantly lower in their perceived benefits of exercise when compared with the Indians and the Malays but no significant difference was found between the Indian and Malay participants in their perceived Benefits of Exercise (Pros).

Conversely, the female participants indicated that their perceived costs for exercise (Cons) were higher than the male participants. There was however no significant difference in their perceived costs of exercise in term of their age-groups.

The Chinese, however, demonstrated that they have higher costs for exercise perception than the Malays and the Indians respectively.

It was anticipated that the perceived benefits of exercise would be higher among the male trainees of higher physical activity level compared with the female trainees. The finding of this current study confirmed this consistency with the previous studies. One likely explanation as suggested by Aşçi, Alfermann, Gagar, and Stiller (2008) is that males are biologically more advantaged to perform physical activity and therefore more successful in achieving task and this gender belief system then in turn develop higher perceived benefits of exercise and also their physical self-perception among the male trainees.

In addition, as discussed earlier, the Chinese have been found to be less active in physical activity in several studies (Callaghan et al., 2002; Flath, 2005; Institute for Public Health, 2008) and therefore it provided no surprise that in this study the Chinese teacher trainees have shown lower perception on the benefits of exercising compared to the other ethnic groups. This finding may be congruent with the view advocated by Callaghan et al. that for the Chinese community exercise is often seen as play and is therefore considered as less important than studying hard. Thus the Chinese might have viewed that engaging in exercising will take up too much of their time that it can be put to better use instead by doing revision. This view is further supported by this study in which it has also been found that the Chinese had consistently demonstrated higher costs for exercise perception than the Malays as well as the Indians respectively.

c) Processes of Change

The processes of change are actions that can be taken in the form of behaviours, cognitions, and emotions that people employ during the course of changing a behaviour (Carron et al., 2003; Prochaska & Marcus, 1994). Prochaska (1979) who originally

defined the processes claimed that there were ten basic processes utilized by people to modify behaviour (see Table 2.1 for the complete list of processes and definitions) and these processes of change can be further categorized into two higher-order factors namely experiential/cognitive factor, and behavioural/ environmental factor (Prochaska & Marcus, 1994; Reed, 1999). In this study, analyses were conducted using only the two higher order factors level.

In terms of the usage of processes of change by the participants (teacher trainees) in this study, the male participants indicated that they used significantly more in both cognitive or experiential (covert) processes and behavioural (overt) processes of change than their female counterparts. In terms of their age groups, there was no significant difference in the type of processes of change used. Nonetheless, from the standpoint of ethnicity, the Chinese participants used significantly less in both the cognitive or experiential (covert) processes and the behavioural (overt) processes of change when compared to the Indians and the Malays participants while there was no difference in the processes of change between the Indians and the Malays.

The findings on the usage of processes of change revealed that those who have higher physical activity level were also making use of more variety of strategies or processes of change (both cognitive and behavioural) in helping them to progress through their stages of exercise behaviour. For instance in the current study, the male trainees who have higher physical activity level, were also found to use more frequently both cognitive and behaviour processes of change. Similarly, the Malay and the Indian trainees who have reported to have higher physical activity level than the Chinese trainees were also using more of both cognitive and behaviour processes of change. The findings of this study apparently indicate that both cognitive and behavioural processes of change or strategies were equally employed by the physically active teacher trainees to help them progress through their stages of readiness to exercise. In other words, there

is a linear increase in the use of the processes of change across the stages of exercise change (from Pre-contemplation to Maintenance). The result of this study was similar to an earlier findings conducted by Wadsworth and Hallam (2007). This might appear contrary to the established proposition of the Transtheoretical Model which state that the use of specific processes of change depends strongly on the individual's stage of change. Specifically, the cognitive processes of change are being utilized more by participants in the earlier stages of change and tends to peak in the preparation stage while the behavioural processes of change are used more by participants in the later stages tends to peak in the action stage (Marcus et al., 1992c; Reed, 1999).

The results of the current study suggest that teacher trainees do not differentiate between cognitive and behavioural processes but use them equally in their endeavour to attain regular exercise behaviour. Recently, some interesting research by Rosen (2000a, 2000b) might be able to shed some light on this findings. According to Rosen, the processes used by individuals in relation to exercise might be different from those used in programmes to change unhealthy behaviours such as smoking cessation, drug abuse, and diet change. Specifically, individuals who are exercising tends to use cognitive processes more frequently during action and maintenance phases than in other phases, because it is assumed that exercising which is a positive behaviour, might be increased if people constantly reflect about it. However, further examinations are needed to confirm these findings.

d) Physical Self Perceptions

Participating in physical activity and perception of competence in physical activity has been closely linked to positive development outcomes such as the development of intrinsic motivation for physical activity, behavioural choice, intensity, and persistence (Boyd et al., 2002). Perceived competence in the form of physical

self-perceptions serve as a measure of self-esteem that focuses on the perceptions of self within the physical activity domain and have been shown to predict exercise behaviour. Examining the physical self-perceptions is essential in order to better understand the psychological benefits that a person can yield from participation in physical activity. In this context, the Physical Self-Perception Profile (PSPP) developed by Fox and Corbin (1989) which measures physical self-perception through four sub-domains (Perceived Sport Competence, Perceived Physical Conditioning, Perceived Bodily Attractiveness, and Perceived Physical Strength) has served as an important measurement tool and has been used widely throughout the world.

In the present study, the results indicated that there were statistically significant differences in the teacher trainees' physical self-perception between the two genders and among the three ethnic groups. However, there was no statistically significant difference in the teacher trainees' physical self-perception in relation to their age groups.

The finding in this study with regard to gender differences in physical self-perception was expected and is in congruent with past studies (Caglar & Asci, 2006; Fox & Corbin, 1989; Lindwall & Hassmen, 2004; Sonstroem et al., 1992). For example, Lirgg (1991) found that the males have demonstrated higher physical self-perception compared with their counterparts. Correspondingly, Caglar and Asci (2006) who examined the physical self-perception of Turkey university students found that male students have consistently showed higher scores in physical self-perception than the females. A possible explanation for the differences between the genders might be due to the perception of gender inappropriateness of physical activity. For example, socialization in sports is reckoned to encourage males to participate competitively in sport to develop masculine characteristics. On the contrary, females are often discouraged to participate competitively in sport to avoid developing their physiques,

attitudes and behaviours that are too masculine (Eitzen & Sage, 1997 cited in Asci et al, 2008). In addition, Daley and Buchanan (1999) indicated women tend to report lower self-efficacy compared to men when a task is perceived to be more masculine. As pointed out by Tan (1991) this similar cultural environment also exists in the Malaysian context. While the Malaysian males are encouraged to be active, expressive, and strong, the females are expected to be passive, soft-spoken, and self-effacing. Hence, in this way, the Malaysian females are discouraged to engage in vigorous physical activity for fear of losing their womanly physiques, attitudes and behaviours.

Schwalbe and Staples (1991) further suggested that the differences between the genders in the physical self-perception may be explained by gender variations in sport socialization, cultural expectations and the availability of opportunities to demonstrate competent behaviour. In retrospect, males tend to have better opportunities to be successful in sport and physical activity owing to the more male dominated and gendered learning environment in physical education (Lee, Fredenburg, Belcher, & Cleveland, 1999; Wright, 1997 cited in Caglar & Asci, 2006). These factors may serve as some of the possible reasons for the gender differences in physical self-perception of the teacher trainees in the current study.

The results of this study also revealed that there were significant differences among the three ethnic groups of the teacher trainees in relation to their physical self-perception profiles. The Chinese participants in this study have demonstrated significantly lower physical self-perception scores when compared with their Malay and Indian counterparts and hence, suggesting that ethnicity may play a role in the variation in physical self-perception among the ethnic groups. This current finding to some extent was consistent with findings from previous studies. For example, Caglar and Asci (2006) in their study found that Turkish university students were generally having lower physical self-perception scores when compared with reported studies involving

university students from the Western cultures such as American, Briton, and Canadian. In another similar study, Asci et al. (2008) found that Turkish university students scored lower in sport competence and endurance than the German university students.

As ethnicity is a cross cultural difference, the variation in physical self-perception among the ethnic groups might then have been attributed by the differential in the ideological background of the participants' cultural group. For instance, regular exercise participation may not be a priority for the members of a particular ethnic group due to the existing norms of that specific group. As mentioned earlier, in the Chinese community, exercise is often seen as play and considered less important than studying hard and hence given low priority (Callaghan et al., 2002). Similarly, the Chinese participants in the current study might have demonstrated the differential ideological background in their physical self-perception when compared with their Malay and Indian counterparts.

Research Question 4: What are the relative strength of the psychological variables in terms of (a) self-efficacy (b) decisional balance (c) processes of change, and (d) physical self-perception in predicting and determining different stages of exercise change (exercise behaviour) among the Malaysian teacher trainees?

Figure 5.1 illustrates the relationships of the psychological variables with the stages of exercise change which in turn show a significant impact on the physical activity levels.

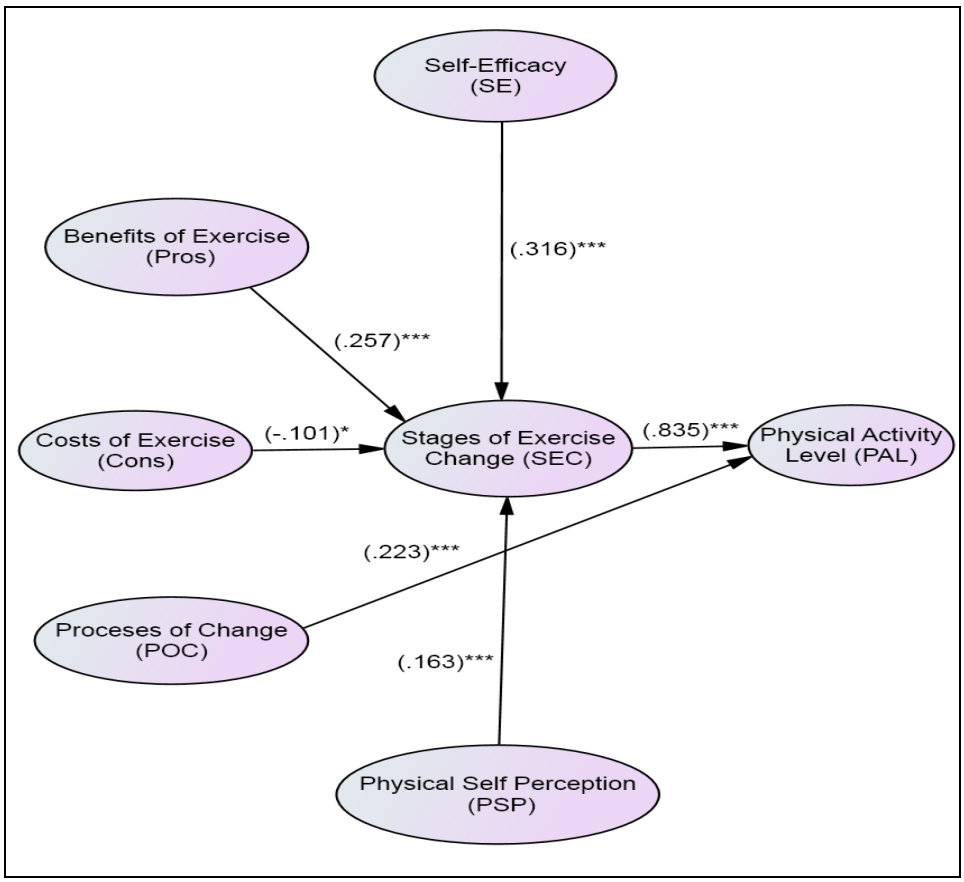


Figure 5.1: Relationships of Psychological Variables with the Stages of Exercise and physical activity levels
Note: *** = p <.001, * = p < .05

As portrayed visually in Figure 5.1, Self-Efficacy, Perceived Benefits of Exercise, Perceived Costs of Exercise and Physical Self-Perception have been established to be significant predictors or determinants of Stages of Exercise but the processes of change was found to be a non-significant predictor of the Stages of Exercise. Self-Efficacy, perceived Benefits of Exercise, and Physical Self-Perception have positive impact on the Stages of Exercise while the perceived Costs of Exercise have a negative impact on Stages of Exercise.

On the other hand, Self-Efficacy, Perceived Benefits of Exercise, Perceived Costs of Exercise and Physical Self-Perception were not directly related to Physical Activity but being mediated by Stages of Exercise.

a) Self-Efficacy and the Stages of Exercise Change

One noteworthy finding of this study shows that self-efficacy has the strongest influence (.316) on the stages of exercise. This implies that self-efficacy is an important construct in influencing the stages of exercise, and further demonstrates the significance of self-efficacy in motivating individuals to move upward along the stages of exercise. Studies have shown that self-efficacy is closely related to physical activity behaviour and a strong predictor of physical activity behaviour (Sallis, Hovell, Hofstetter, & Barrington, 1992). This study also confirmed findings from previous studies (Callaghan et al., 2002; Kim, 2004; Nigg & Courneya, 1998) that indicate self-efficacy for exercise would increase across the stages of exercise change. This is most likely due to the high level of confidence and the feeling of more readiness for exercise possessed by the individuals with high self-efficacy. In this study, Self-Efficacy construct has the strongest correlation with the stages of exercise change among all the constructs analysed. However, it was unclear whether the increase in self-efficacy with advancing stages of exercise is an antecedent or consequences of exercise adoption. Gorely and Bruce (2000) in their recent study found that individuals who adopted exercise and who have changed the most in their self-efficacy, have the highest self-efficacy score at baseline. Their finding suggested that self-efficacy may have a role as an antecedent of change and that increasing the self-efficacy is important in facilitating advancing movement within the stages of exercise change.

It is purported that people who have high self-efficacy may be more willing to take risks, more confident in their ability to try new things, and more persistent to succeed (U.S. department of Health and Human Services, 1999). On the other hand, individuals with low self-efficacy will find difficulty in getting started and easily discouraged from carrying out their intention to exercise when encountered with obstacles. Hence based on this premise, it could be affirmed that individuals with low

self-efficacy but intend to be physically active will first need to strengthen their self-efficacy for exercise. Any intervention programmes should therefore focus on helping individuals to increase their self-efficacy for exercise than merely providing them with physical activity programmes to participate. These individuals need to be given training that helps them to develop fundamental skills (such as managing of moods, emotions, distractions and temptations) to encounter challenging situations that may disturb the continuation of regular active lifestyles. Improving individuals self-efficacy will eventually leads to higher level of physical activity participation (Marcus & Forsyth, 2003b).

The results exhibited in Figure 5.1 shows that Self-Efficacy affect the Stages of Exercise change directly, and that indirectly it emerged as having the strongest effect on physical activity levels via the stages of exercise change, which acts as a mediating construct. In conclusion, these findings distinctly illustrate that self-efficacy is the most influential construct on the physical activity levels mediated by the stages of exercise.

b) Decisional Balance and the Stages of Exercise Change

In the field of physical activity behaviour, decisional balance refers to a person's perception of the benefits of engaging in physical activity compared to the costs of physical activity. Decisional balance has become a well-studied construct in physical activity. Generally, individuals who participate in physical activity have a Benefits of Exercise (Pros) in that the perceived benefits of exercise outweigh the negative aspects of it.

In the current investigation, the perceived benefit of exercise (.257) is shown to have a greater impact on the stages of exercise compared to the perceived costs of exercise (-.101). The results exhibited in Table 4.23 shows that the perceived benefit of exercise affects the Stages of Exercise Change directly, and that indirectly it emerged as

having a significant effect on physical activity levels via the stages of exercise change, acting as a mediating construct. On the other hand, the perceived costs of exercise affect negatively the stages of exercise indirectly but have a non-significant direct effect on the physical activity levels. Perceived benefits of exercise emerged as having a stronger indirect effect on physical activity levels compared to the perceived cost of exercise. In conclusion, these findings undoubtedly illustrate that the perceived benefit of exercise is a more important predictor of the stages of exercise and in turn, it has a significant impact of the physical activity levels. It is therefore crucial for those involved in exercise promotion to help individuals contemplating to exercise to realize all the benefits of exercise to help them advance from contemplation stage to the preparation stage.

c) Processes of change and the Stages of Exercise Change

Generally, the processes of change are covert or overt activities that individuals engage during the process of changing to a desired behaviour. Existing literature hypothesize that these processes of change can be categorized into two types that is cognitive and behavioural (Prochaska & Marcus, 1994; Reed, 1999) and that the use of specific processes of change depends strongly on the individual's stage of change. For instance, the cognitive processes of change are more important to participants in the earlier stages of change while the behavioural processes of change are used more by participants in the later stages (Marcus et al., 1992c; Reed, 1999). However, the findings of this study indicate that both cognitive and behavioural processes of change or strategies were equally engaged by the teacher trainees to help them progress through their stages of readiness to exercise. In other words, there is a linear increase in the use of the processes of change across the stages of exercise change (from Pre-contemplation to Maintenance).

The results of the current study clearly support the notion that the participants do not differentiate among the processes of change in their effort to modify their exercise behaviour. In other words, the differences between the two construct namely cognitive processes and behavioural processes were just conceptual in nature. As demonstrated in this study, the participants were unable to discriminate the two different types of processes of change. This findings also supported earlier studies conducted by Wadsworth and Hallam (2007) and Dishman and colleagues (2010b) who found that individuals utilized both experiential and behavioural processes in their attempts to maintain their physical activity.

Then again, in this study the correlation between these two factors is .98 which is extremely high and exceeding the .90 criteria proposed by Hair et al. (1998). Fundamentally, an extremely high correlation between two factors implied that the two factors are essentially measuring the same characteristics and would not be substantively meaningful. As described earlier, the processes of change for exercise measurement model used in this study was based on a single factor model in contrast to most past studies that employed the two factors second order model in order to preserve the original structure of the processes of change model (Paxton et al., 2008). A decision had been taken to use a one factor model for the processes of change by loading all the indicator variables into one factor (Byrne, 2001).

As shown in Figure 5.1, the one factor model process of change has a significant direct effect (.223) on the physical activity levels. However, it has a non-significant influence on the stages of exercise change. It shows that these findings clearly demonstrate that process of change has a direct influence on the physical activity and not mediated by the stages of exercise change. In fact, this could be a significant contribution to the existing literature and suggests the all-purpose usage of processes of change in physical activity adherence among the participants contrary to the

conventional beliefs that individual employ different processes of change for different stages of exercise.

d) Physical Self Perceptions and the Stages of Exercise Change

Generally, Physical Self-Perception gives its importance and establishes relationship with physical activity has become an important psychological construct in explaining why people engage in exercise and others do not. According to Fox and Corbin (1989) the Physical Self-Perception Profile (PSPP) is formed through four different types of physical perceptions: Perceived Sport Competence (athletic ability, ability to learn new sport, confidence in sport), Perceived Physical Conditioning (stamina, fitness, confidence in an exercise surroundings), Perceived Bodily Attractiveness (attractive physique, ability to main an attractive body, confidence in appearance), and Perceived Physical Strength (perceived strength, muscular development, confidence in situations requiring strength). It is theorized that individuals are drawn towards activities in which they can demonstrate a high degree of skills or competence (Hayes, Crocker, & Kowalski, 1999) and hence it is logical that physical self-perceptions should be positively related to levels of physical activity. In a study conducted by Fox and Corbin (1989) it was found that the subscales of physical strength, sport competence and conditioning were able to discriminate between active and non-active participants of both genders. Moreover, Sonstroem et al. (1992) found that physical conditioning dimension of self-perception among adults was the most dominant predictor of exercisers and non-exercisers and the degree of physical activity involvement .

In this current investigation, the physical self-perceptions which comprise of indicators such as perceived sport competence/physical conditioning (perceived physical conditioning was combined with perceived competence due to high coefficient

between the two subdomains), perceived bodily attractiveness and perceived physical strength have demonstrated as having an impact on physical activity levels. However, the physical self-perceptions were found to only influence the physical activity levels indirectly via the stages of exercise which act as a mediating construct.

Research Question 5: Does the proposed model for exercise/physical activity fit with the data collected?

One of the aims of this study is to develop a theoretical model that will be able to explain the determinants of physical activity involvement. In this regard, the empirical measures conducted for this study particularly aims to examine the relationships among the constructs incorporated in the conceptual framework (see Figure 1.1).

A two-step structural equation modelling approach using the AMOS 16.0 programme was employed in estimating the parameters. This strategy involved the separate estimation of the measurement model (how well the observed variables define their respective construct) prior to the simultaneous estimation of the measurement and the structural model (how well the latent constructs relate to each other). Five measurement scales were identified and applied on the current exercise/physical activity adherence investigation. The core constructs are the Stages of Exercise Change, Self-Efficacy, Decisional Balance for Exercise, Processes of Change for Exercise and The Physical Self-Perceptions. The methods used to validate the measures employed in this study were inspected via the confirmatory factors analysis (CFA). Consistent with the current recommended best practices, chi-square (χ^2) goodness of fit, the Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) were employed to assess the model's fit. The measurement sub-models were assessed

for convergent validity, unidimensionality, reliability and discriminant validity. Taking into account the outcomes derived from the estimation of the measurement model, it could be concluded that all the measures have successfully achieved the needed measurement attributes in terms of convergent validity, unidimensionality, reliability and discriminant validity. As demonstrated in Figure 4.7, with the exception of the χ^2 value (χ^2 = 915.674, *df* = 410, and $p < .001$) which indicated a lack of fit between the proposed overall measurement model and observed data, all the other adjunct fit measures employed to evaluate the plausibility of the proposed model on the other hand, have indicated that the model represent an adequately fit model (CFI = .960, GFI = .934, SRMR = .0431 and RMSEA = .035). All these fit indices were within the recommended cut off values for adequate model fit.

Subsequently, the structural equation modelling (SEM) was used to illustrate the simultaneously effect of all the constructs integrated in the hypothesized model for exercise behaviour. The hypothesized relationships between the constructs were displayed in Figure 4.8.1. The initial evaluation of the overall fit of the hypothesized model seemed to fit adequately with the observed data. All the measured variables were moderately correlated with their respective constructs. However, five of the eleven hypothesized linkages were not significant. Consequently the model was re-specified as recommended by Byrne (2001) in order to establish a more parsimonious and best-fit model. Re-specification of the initial model was done by deleting the five non-significant paths from the initial hypothesized model. According to Byrne (2001), in evaluating the extent to which a re-specified model show improvement in fit, it is a common practice to determine if the difference in fit between the models is statistically significant. The re-estimation of the model yielded χ^2 value of 822.334, *df* = 415, and $p < .001$. There was slight erosion in model fit from χ^2 = 815.674 for the original model to χ^2 = 822.334 for the re-specified model. Although the difference in χ^2 showed a

marginal increase in χ^2 value ($\Delta\chi^2_{(5)} = 6.66$) indicating a further decrease from the initial overall model fit, it was however not significant. In addition, the re-specified model has gained five more degree of freedom (*df*) and hence making the re-specified model a more parsimonious model of the two models in comparison. The gain of five degrees of freedom came from the five non-significant paths that were deleted from the initial model.

To assess the accuracy of the prediction in the structural equations, the proportion of variance accounted for (R^2) was examined. In this study, Self-Efficacy was positively associated with the Stages of Exercise Change (.316). Perceived Benefits of Exercise (.257) and Physical Self-Perception (.163) were also positively associated with the Stages of Exercise Change. However, Perceived Costs of Exercise was negatively associated with stages of exercise (-.101). These four constructs (Self-Efficacy, Perceived Benefits of Exercise, Perceived Costs of Exercise and Physical Self Perception) were indirectly related to Physical Activity being mediated by the Stages of Exercise Change and together they accounted for 35.1% (R^2=.351) of the variance for the stages of exercise. On the other hand, the Processes of Change was the only construct directly related to the Physical Activity (.223). As expected, the Stages of Exercise Change was a strong predictor of physical activity (.835). Collectively, the Stages of Exercise Change with the Processes of Change accounted for 91.1% (R^2=.911) of the variance for Physical Activity.

The important predictive role of the Stages of Exercise Change on physical activity (exercise behaviour) was also reported in the study of Marcus, Eaton, Rossi and Harlow (1994). However, the variance explained in exercise behaviour in the studies by Marcus and colleagues using only three constructs namely Self-Efficacy, Perceived Benefits of Exercise (Pros) and Perceived Costs of Exercise (Cons) were 28% whereas the variance explained by the model in this study was much higher (91.1%). This

finding was however anticipated since the current model includes more constructs from the Transtheoretical Model (Self-Efficacy, Perceived Benefits of Exercise and Perceived Costs of Exercise, Processes of Change) and also the Physical Self-Perception. Other past studies (Kim & Cardinal, 2010) have also indicated that Self-Efficacy, Perceived Benefits of Exercise (Pros) and Perceived Costs of Exercise (Cons) were important constructs in predicting of exercise behaviour. Hence, it could be concluded that the model proposed in this study was able to provides further information towards better understanding exercise behaviour. It further supports the application of the Transtheoretical Model as an integrative model for measuring the exercise behaviour among the Malaysian teacher trainees.

Having discussed the findings in this study with respect to the research questions established earlier, the following section discussed on some of the implications for educational practice and then the recommendations for future studies.

5.2 Implication to Educational Practice

This study has provided the support for the use of the Transtheoretical Model in examining the exercise behaviour among teacher trainees. The current study introduced an integrated model with the combination of variables from the Transtheoretical Model and the Physical Self Perception that contributed towards better understanding of exercise behaviour among teacher trainees. The variables such as self-efficacy, decisional balance, processes of change for exercise together with the physical self-perception were found to be related factors in influencing exercise behaviour among teacher trainees.

a) Enhancing of Self-Efficacy to Exercise

The current study shows that the self-efficacy of the teacher trainees exhibits the strongest direct relationship to the exercise behaviour of the teacher trainees. Stated differently, the actual ability to adhere to an exercising regime (desired behaviour) could be estimated by one's perception in the confidence level of one's ability to be active physically on a regular basis. Disruptive circumstances such as bad weather, bad mood, work stress and anxiety could lower self-efficacy perceptions towards adherence to exercising and generate further stress and anxiety about one's capability to do so. In realizing the strong relationship between self-efficacy and exercise behaviour, it is pertinent for the teacher education division being the direct organization responsible for the training and development of teachers in the country to initiate programmes that can enhance the self-efficacy of teacher trainees towards physical activity. Administrators should not merely organized exercise or physical activities programme and hope that they will self-generate the interest to participate. In this context, workshops, clinics and training sessions should be organized to educate trainees to develop their self-efficacy towards physical activity such as how to exercise control over moods, emotions, distractions, temptations, or decision making so that their sense of self-efficacy to exercise is not threatened when encountering with potentially challenging situations. For instance, throughout their teacher training programme, teacher trainees are consistently stressed out to complete assignments and course work. Therefore, if these teacher trainees are given the opportunity to experience exercise behaviour that demonstrate the effectiveness of physical activity as a successful stress management strategy, then there is a greater possibility for them to realize the relevance of exercise in their lifestyles.

In fact, McAuley in 1994 (cited in Carron et al., 2003) proposed a series of strategies in enhancing self-efficacy in physical activity. These strategies include

vicarious learning, verbal persuasion and mastery learning. Vicarious strategy is about ensuring that participants observing other people similar in age, physical characteristics and capabilities successfully engaging in the specific activity (exercising). Bringing in health and fitness experts to the campuses for demonstrations and promotion can serve as an effective way to encourage trainees to get engage in physical activities. In addition to this, college administrators through their various students affairs departments can also organise orientation classes or sessions to introduce health and fitness programmes and the exercise facilities that are available in campuses to encourage the trainees especially those who are in the precontemplation and contemplation stages to get on to active lifestyles.

Verbal persuasion on the other hand, is about making available to the participants information pertaining to why, what, and where to get the required physical activity. This strategy can be easily implemented in the teacher training institutions as there are sufficient spaces available for them to put up posters, newsletters and health bulletin to provide information and guidance to the trainees who are new to physical activity and may need the extra information to motivate them. Besides that, the institutions' resource centres provide readily available articles, magazines books relating health and physical activity. In addition, administrators and health and fitness staff can organise orientation seminars to encourage participation and forming social support groups that can help to promote active physical lifestyles in the campus.

The principle of mastery experiences is about ensuring participants to have the experience performing a task successfully through gradual increase of the physical challenge such as speed, load and repetitions of the activity. This strategy can also be implemented without much difficulty in the various teacher training institutions. Since most of the teacher training institutions have hostels for their trainees, the institutions' administrators or even the students' union or various clubs in the teacher training

institutions can organised for a start, low impact physical activity (less vigorous) program that allow the participaqnts especially the non-active trainees to gradually get involved in physical activity. For instance, walking to class campaign can be organised to encourage all trainees to walk to their classes instead of using their motor transportation to attend their classes. Such activity not only facilitates the trainees to gradually get used to physically active lifestyle, but also helps to create a greenier and healthy environment in campuses since this may lead to lesser fuel usage due to less motor transportation. When these trainees have experienced success in their participation, then higher impact activities can be organised for those who desire to achieve greater success in physical activity. All these activities can eventually lead to the enhancement of the self–efficacy for exercise among the teacher trainees specifically to those who are at the lower stages of exercise change.

b) Improving of Decisional Balance for Exercise

In the field of physical activity behaviour, decisional balance refers to a person's perception of the benefits of engaging in physical activity compared to the costs of physical activity. It is hypothesized that an individual is not expected to change or to continue in an activity unless the "balance sheet" indicate the gains exceeded the losses (Gorely & Gordon, 1995). In other words, people must see there are a lot of benefits and not too many barriers in devoting the time and effort needed to exercise regularly.

In the present investigation, the perceived benefit of exercise (.181) of the teacher trainees is shown to have a greater impact on the stages of exercise compared to the perceived costs of exercise (-.094). In other words, if we can emphasize more benefits of exercising to the trainees, then it is more likely that more trainees will see more of the positive aspects of participation in physical activity and find physical activity experience more pleasant and rewarding. It is therefore crucial for those

involved in exercise promotion to help trainees who are contemplating to exercise to realize all the benefits of exercise so as to help them shift from contemplation stage to the preparation stage. In ensuring that teacher trainees could perceive more benefits of exercise, strategies that help to minimize the barriers or cost of exercise will also aid trainees to see more benefits and hence contribute further towards enhancing the likelihood to be successful in the attempt to encourage more teacher trainees to be active physically particularly those who are thinking about becoming more active but has not engaged in any actual physical activity.

Consequently, it is recommended that the teacher preparation programmes explicitly address this issue through specific types of training and educational experiences that focus on helping teacher trainees recognise more benefits of involving in physical activity or exercising such as better body image, greater physical competence and greater psychological well-being. Through such concerted efforts, teacher trainees would be able to correct on their perceptions that participation in physical activity is an effective way to reduce stress and worry and not the sources of further hassle and anxiety in the daily lifestyle of a college student.

c) The Use of Processes of Change

Although the existing literature hypothesize that processes of change can be categorized into two types that is cognitive and behavioural (Prochaska & Marcus, 1994; Reed, 1999) and that the use of specific processes of change depends strongly on the individual's stage of change, the findings of this study indicate that both cognitive and behavioural processes of change or strategies were equally engaged by the teacher trainees to assist them progress through the stages when making a lifestyle physical activity change. Both types of processes of change show incremental usage across the stages of exercise change (from Pre-contemplation to Maintenance). Similar findings

were reported by Wadsworth and Hallam (2007) and Dishman and colleagues (2010b) who found that individuals utilized both cognitive and behavioural processes in their attempts to maintain their physical activity.

For that reason, based on the findings of this study, it is suggested that fitness instructors, personal trainers, and other fitness professionals or motivators may need to encourage the use of both cognitive and behavioural processes of change or strategies regardless of participants' stages of motivational readiness for change as studies (Rosen, 2000a, 2000b) have demonstrated that participants can still benefit from using cognitive processes to progress in the later stages of exercise contrary to the conventional belief that cognitive processes are more relevant in helping people at the early stages of behaviour change (Brehm, 2004; Prochaska & Marcus, 1994; Reed, 1999).

d) The Physical Self-Perception

Participating in physical activity and perception of competence in physical activity has been closely linked to the development of intrinsic motivation for physical activity (Boyd et al., 2002; Fox & Corbin, 1989). In this study, results revealed that there were significant differences in the teacher trainees' physical self-perception between the two genders and among the three ethnic groups. These results have significant implications for the importance placed on physical self-perception as a way to facilitate exercise and health-related physical activity. Marsh, et al., (2006) using the reciprocal effects model suggest that physical self-perception and exercise behaviour are "reciprocally related and mutually reinforcing" (p. 326). Specifically, they speculated that enhancing one's physical self-perception will lead to improved exercise behaviour and consequently improved exercise behaviour will lead to better physical self-perception.

Based on the reciprocal effects model, physical education teachers, fitness instructors, personal trainers, and other health care professionals should make every effort to improve both physical self-perception and exercise behaviour at the same time. Any intervention programme to improve exercise behaviour should seriously consider taking advantage of this coupling effect.

5.3 Conclusion

Teacher trainees play an inevitable significant role in our society for they are not only the future leaders in the society but also the educators, trainers and moulder of our future generation. As leaders and trainers, their physical activity behaviours will definitely not only affect their own health for they must also serve as role models to the younger generation. With such great responsibility bestowed upon them, they themselves must be exemplars of the desired healthy active lifestyle so that they are able to take charge of their own habitual physical activity.

However, it is disheartening and a cause of concern to discover that there is as high as 66.3% of teacher trainees in the study who are entrusted to lead our younger generation are they themselves are not participating in an adequate amount of physical activity to gain health benefits. Therefore, it is concluded that immediate concerted efforts are required to develop an effective intervention programme by the authorities taking charge of the teacher education. This intervention programme aims specifically at assisting more teacher trainees to adopt active lifestyles not only during training per se but also guiding them to practise lifelong participation in physical activity.

Gender, age and ethnicity are some of the personal determinant factors on physical activity. Nevertheless, gender and ethnicity (culture) seemed to have greater impact in influencing physical activity adherence than age in the study. Participants categorized by their age groups did not differ in their level of physical activity. Hence, it

is concluded that age is not a significant factor in determining the physical activity levels of young teacher trainees.

Male and female participants demonstrated differences in the level of physical activity, weekly leisure time exercise score, self-efficacy, in the benefits and costs of exercises, and the processes of change. Therefore, it is concluded that gender is an important factor in determining the exercise behaviour among the young teacher trainees.

Besides, the Chinese participants have been consistently found to be having lower self-efficacy, perceived benefits of exercise, and lower physical self-perception but nonetheless have higher perceived costs for exercise. One salient point to note is that, there was no significant difference between the Malay and the Indian participants. Hence it can be surmised that exercise behaviour is culturally specific (Flath, 2005) and that ethnicity is an important factor in determining the exercise behaviour of a diverse community.

In conclusion, the results of this study demonstrated that Self-Efficacy, Perceived Benefits of Exercise, and Physical Self-Perceptions influenced physical activity indirectly. Self-Efficacy, Perceived Benefits of Exercise, and Physical Self-Perceptions were mediated by the Stages of Exercise which correlated directly with physical activity. The only construct that influenced physical activity directly was the Processes of Change for Exercise.

5.4 Recommendations

Based on the results of the current study, the following recommendations for future research are presented:

a) Self-efficacy construct has the strongest correlation with the stages of exercise change among all the constructs analysed. However, it was unclear whether the increase in

self-efficacy with advancing stages of exercise is an antecedent or consequences of exercise adoption since this study only drew on a cross sectional study approach. Therefore, future research should employ longitudinal study to explicate this.

b) The findings are limited in that they are based on self-report data with no objective information on the actual exercise behaviour. Although self-reports of exercise are used widely due to the low cost and easy administration, they are subjected to biasness particularly the social desirability biasness. Thus, future studies should utilize more objective measures such as the use of pedometers, and/or accelerometers to provide validity evidence and control of social desirability biasness.

c) One finding that is worth noting from this study is the ethnic-related variations in physical activity participation. The Chinese participants have consistently indicated their low levels of participation in physical activity and across the stages of exercise change and this may be due to the Chinese culture. As claimed by Flath (2005) "it is a Chinese virtue to be less physical and Chinese polite society promotes in intellectual learning over physical activity" (p. 37). She further suggests that commonly held health beliefs and practices of exercise behaviour are culturally specific in nature. Therefore it is crucial that future studies should examine these cultural differences and observe how such differences are interpreted at individual and societal levels.

d) As noted by Katzmarzyk (2007) access to recreational resources may differ by socioeconomic status (SES) across ethnic groups. Data pertaining to the SES of the participants was not collected in this study. Some of the differences between the ethnic groups may have been the results of the variations in SES and therefore the possibility that certain ethnic groups were predominantly from a particular SES background cannot be ruled out. Therefore, future studies should also take into consideration the SES factor in trying to better understand the exercise behaviour adherence.

e) In this study, due to the small number of participants classified under certain stages and creating unequal sample size for each stage, the five stages of exercise behaviour was reclassified into only three stages; Pre-contemplation/Contemplation Stage (inactive in physical activity), Preparation Stage (engaging in physical activity but not regular enough) and Action/Maintenance Stage (active engaging in physical activity). Accordingly, future study would benefit from ensuring sample that are more representative of each of the stages of exercise change and hence can represent the views of the groups more accurately.

f) Data from this study revealed that the correlation observed between the experiential processes and behavioural processes was extremely high (.98) suggesting the existence of redundancy between the two factors. In other words, these two factors are basically measuring the same characteristics. As past studies have also revealed high correlations between the two factors, more research is needed to provide empirical support for the conceptual distinction between the experiential processes and behavioural processes of change and to determine whether it is worth preserving the original structure of a two-factor second order model specifically for exercise behaviour.

REFERENCES

American Cancer Society. (2003). Cancer facts and figures 2003. Atlanta, GA: Author.

American Heart Association. (2002). Heart and stroke statistical update. Dallas, TX.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation Modeling in Practice: A review and Recommended Two-Step Approach. *Psychological Bulletin, 103*(3), 411-423.

Anderson, L. B., Schnohr, P., Schroll, M., & Hein, H. O. (2000). All-cause mortality associated with physical activity during time, work, sports and cycling to work. *Archives of Internal Medicine, 160,* 1621-1628.

Arent, S. M., Landers, D. M., & Etinier, J. L. (2000). The effects of exercise on mood in the elderly: A meta-analytic review. *Journal of Aging and Physical Activity, 8,* 407-430.

Armstrong, C. A., Sallis, J. E., Hovell, M. E., & Hofstetter, C. R. (1993). Stages of change, self-efficacy, and the adoption of vigorous exercise: A prospective analysis. *Journal of Sport and Exercise Psychology, 15*, 390-402.

Ary, D., Jacobs, C. J., & Razavieh, A. (1990). *Introduction to research in education* (4th ed.). Fort Worth: Holt, Rinehart and Winston, Inc.

Aşçi, F. H., Alfermann, D., Gagar, E., & Stiller, J. (2008). Physical self-concept in adolescence and young adulthood: A comparison of Turkish and German students. *International Journal of Sport Psychology, 39*(3), 217-236.

Ball, K., Owen, N., Salmon, J., Bauman, A., & Gore, C. J. (2001). Associations of physical activity with body weight and fat in men and women. *International journal of Obesity, 25*, 914-919.

Barrett, B. S. (1997). *An application of the transtheoretical model to physical activity.* Ph.D., University of Minnesota, United States -- Minnesota. Retrieved from http://proquest.umi.com/pqdweb?did=736810551&Fmt=7&clientId=28403&RQT=309&VName=PQD

Berger, B. G., Pargman, D., & Weinberg, R. S. (2002). *Foundations of exercise psychology*. Morgantown, WV: Fitness Information Technology.

Berry, T., Naylor, P. J., & Wharf-Higgins, J. (2005). Stages of change in adolescents: an examination of self-efficacy, decisional balance, and reasons for relapse. *Journal of Adolescent Health, 37*(6), 452-459.

Beth Sigman, S. (2007). Relating Physical Education and Activity Levels to Academic Achievement in Children. *Journal of Physical Education, Recreation & Dance, 78*(1), 10.

Blair, S. N., Khol, H. W., III , Barlow, C. E., Paffenbarger, R. S., Jr. , Gibbons, L. W., & Macera, C. A. (1995). Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. *Journal of the American Medical Association, 273*, 1093-1098.

Blair, S. N., Wells, C. L., Weathers, R. D., & Paffenbarger, R. S. J. (1994). *Chronic disease: The physical activity dose-response controversy. In: Dishman D.K. (ed.) Advances in exercise adherence* Champaign, IL.: Human Kinetics.

Blanchfield, J., Cardinal, B. J., Lee, J.-Y., & Kim, Y.-H. (2006). Transtheoretical Model Constructs as Predictors of Transitional Shift Patterns for Physical Activity Behavior Among College Students. (Abstract). *Research Quarterly for Exercise & Sport, 77*(1 Suppl), A-74.

Bouchard, C., Blair, S., N., & Haskell, W., L. (2007). *Physical activity and health*. Champaign, IL: Human Kinetics.

Boyd, M. P., Weinmann, C., & Yin, Z. (2002). The Relationship of Physical Self-Perceptions and Goal Orientations To Intrinsic Motivation for Exercise. *Journal of Sport Behavior, 25*(1), 1.

Brehm, B. A. (2004). *Successful fitness motivation strategies*. Champaign, IL: Human kinetics.

Bucksch, J., Finne, E., & Kolip, P. (2008). The transtheoretical model in the context of physical activity in a school-based sample of German adolescents. *European Journal of Sport Science, 8*(6), 403-412.

Bull, S. J. (2001). *Adherence issues in sport and exercise*. Chichester: Wiley.

Bunting, C. J. (1982). Managing stress through challenge activities. *Journal of physical education, recreation and dance, 53(10),* 48-49.

Burger, M., & Dolny, D. (2002). The Relationship Among Body Mass Index, Body Image, Exercise Habits and Stage of Change in College-Aged Females. *Women in Sport & Physical Activity Journal, 11*(2), 1.

Byrne, B. M. (2001). *Structural Equation Modeling with AMOS: Basic concepts, applications and programming*. New Jersey: Lawrence, Erlaum Associates, Inc.

Caglar, E., & Asci, F. H. (2006). Gender and physical activity level differences in physical self-perception of university students: A case study of Turkey. *International Journal of Sport Psychology, 37*, 58-74.

Callaghan, P., Eves, F. F., Norman, P., Chang, A. M., & Cheung, Y. L. (2002). Applying the Transtheoretical Model of Change to exercise in young Chinese people. *British Journal of Health Psychology, 7*(3), 267.

Callaghan, P., Khalil, E., & Morres, I. (2010). A prospective evaluation of the Transtheoretical Model of Change applied to exercise in young people. [Article]. *International Journal of Nursing Studies, 47*(1), 3-12. doi: 10.1016/j.ijnurstu.2009.06.013

Cardinal, B. J. (1995a). Behavioral and biometric comparisons of the preparation, action, and maintenance stages of exercise. *Wellness Perspectives, 11*(3), 36.

Cardinal, B. J. (1995b). The stages of exercise scale and stages of exercise behavior change in female adults. *Journal of Sports Medicine and Physical Fitness, 35*, 87-92.

Cardinal, B. J. (1997). Predicting exercise behavior using components of the transtheoretical model of behavior change. *Journal of Sport Behavior, 20*(3), 272.

Cardinal, B. J., Lee, J. Y., Kim, Y. H., Lee, H., Li, K. K., & Si, Q. (2009). Behavioral, Demographic, Psychosocial, and Sociocultural Concomitants of Stage of Change for Physical Activity Behavior in a Mixed-Culture Sample. [Article]. *American Journal of Health Promotion, 23*(4), 274-278.

Cardinal, B. J., Tuominen, K. J., & Rintala, P. (2004). Cross-Cultural Comparison of American and Finnish College Students' Exercise Behavior Using Transtheoretical Model Constructs. *Research Quarterly for Exercise & Sport, 75*(1), 92-101.

Carmody, T. P., Senner, J. W., Manilow, M. R., & Matarazzo, J. D. (1980). Physical exercise and rehabilitation: Long-term dropout rate in cardiac patients. *Journal of Behavioral Medicine, 3*, 163-168.

Carrol, B. (1993). Factors influencing ethnic minority groups' participation in sport. *Physical Education Review, 16*(1), 55-56.

Carron, A. V., Hausenblas, H. A., & Estabrooks, P. A. (2003). *Psychology of physical activity*. Boston: McGraw-Hill Co.

Clark, D., Blair, S., & Culan, M. (1988). Are HPE teachers good role models? *journal of Physical Education, Recreation & Dance, 59(7)*, 76-80.

Coffman, D. L., & MacCallum, R. C. (2005). Using parcels to convert path analysis models into latent variable models. *Multivariate Behavioral Research, 40*(2), 235-259.

Corbin, C., & Lindsey, R. (1994). *Concepts of physical fitness with laboratories* (8th ed.). Dubuque, IA: Wm. C. Brown Communications, Inc.

Corbin, C. B., Welk, G. J., Lindsey, R., & Corbin, W. R. (2004). *Concepts of fitness and wellness : a comprehensive lifestyle approach* (5th ed.). Boston: McGraw-Hill.

Craft, L. L., & Landers, D. M. (1998). The effects of exercise on clinical depression and depression resulting from mental illness: A meta-analysis. *Journal of Sport & Exercise Psychology, 20*, 339-357.

Creswell, J. W. (2008). *Educational research: planning, conducting, and evaluating quantitative and qualitative research.* (3rd ed.). New Jersey: Pearson Prentice Hall.

Daley, A. J., & Buchanan, J. (1999). Aerobic Dance and Physical Self-Perceptions in Female Adolescents: Some Implications for Physical Education. *Research Quarterly for Exercise and Sport, 70*(2), 196-200.

Daley, A. J., & Leahy, J. (2003). Self-perceptions and participation in extra-curricular physical activities. *Physical Educator, 60*(2), 13-19.

De Bourdeaudhuij, I., Philippaerts, R., Crombez, G., Matton, L., Wijndaele, K., Balduck, A. L., & Lefevre, J. (2005). Stages of change for physical activity in a community sample of adolescents. [Article]. *Health Education Research, 20*(3), 357-366. doi: 10.1093/her/cyg131

de Vaus, D. (2002). *Analyzing social science data: 50 key problems in data analysis*. London: SAGE Publications Ltd.

de Vaus, D. A. (2001). *Research design in social research*. London: Sage Publication.

de Vries, L. A. (2008). *Overview of recent innovative practices in physical education and sports in Asia*. Bangkok: Asia-Pacific Programme of Education Innovation for Development, United Nations Education, Scientific and Cultural Organization.

Dishman, R., Jackson, A., & Bray, M. (2010a). Validity of Processes of Change in Physical Activity Among College Students in the TIGER Study. *Annals of Behavioral Medicine, 40*(2), 164-175. doi: 10.1007/s12160-010-9208-2

Dishman, R., Vandenberg, R., Motl, R., & Nigg, C. (2010b). Using Constructs of the Transtheoretical Model to Predict Classes of Change in Regular Physical Activity: A Multi-Ethnic Longitudinal Cohort Study. *Annals of Behavioral Medicine, 40*(2), 150-163. doi: 10.1007/s12160-010-9196-2

Dishman, R. K. (1988). *Exercise adherence : its impact on public health*. Champaign, Ill.: Human Kinetics Books.

Dishman, R. K. (1994). *Advances in exercise adherence*. Champaign, IL ; Leeds: Human Kinetics.

Dishman, R. K., Heath, G., & Washburn, R. A. (2004). *Physical activity epidemiology*. Champaign, IL: Human Kinetics.

Douthitt, V. L. (1994). Psychological determinants of adolescents exercise adherence. *Adolescence, 29*(115).

Duda, J. L. (1998). *Advances in sport and exercise psychology measurement*. Morgantown, W. Va.: Fitness Information Technology Inc.

Ebbeck, V., & Stuart, M. E. (1996). Predictors of self-esteem with youth basketball players. *Pediatric Exercise Science, 6*, 368-378.

Fallon, E. A., Hausenblas, H. A., & Nigg, C. R. (2005). The transtheoretical model and exercise adherence: examining construct associations in later stages of change. *Psychology of Sport & Exercise, 6*(6), 629-641.

Feltz, D. L., Short, S. E., & Sullivan, P. J. (2008). *Self-efficacy in sport*. Champaign, IL: Human Kinetics.

Field, A. (2009). *Discovering Statistics Using SPSS* (3rd. ed.). London: Sage.

Field, A. P. (2005). *Discovering statistics using SPSS : (and sex, drugs and rock 'n' roll)* (2nd ed.). London: SAGE.

Flath, S. C. (2005). *Cross-cultural comparison of college students' physical activity behaviors in the United States and Republic of China using transtheoretical model constructs.* Ph.D., Oregon State University, United States -- Oregon. Retrieved from http://proquest.umi.com/pqdweb?did=888858471&Fmt=7&clientId=28403&RQT=309&VName=PQD

Fletcher, G. F., Balady, G., Blair, S. N., Blumenthal, J., Caspersen, C., Chaitman, B., & al., e. (1996). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans. *Circulation, 94*, 857-862.

Fox, K. (1998). *Advances in the measurement of physical self*: Fitness Information Rechnology.

Fox, K. (2000). *The effects of exercise on self-perceptions and self-esteem. In Biddle, S.J.H. Fox, K., Boutcher, S.H. (eds.) Physical activity and psychological well-being*. London: Routhledge & Kegan Paul.

Fox, K. R., & Corbin, C. B. (1989). The physical self-perception profile: Development and preliminary validation. *Journal of Sport & Exercise Psychology, 11*(4), 408-430.

Godin, G. (1994). *Social-Cognitive Models*. Champaign, IL ; Leeds: Human Kinetics.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian journal of applied sport sciences. Journal canadien des sciences appliquees au sport, 10*(3), 141-146.

Gorely, T., & Bruce, D. (2000). A 6-month investigation of exercise adoption from the contemplation stage of the transtheoretical model. *Psychology of Sport and Exercise, 1*(2), 89-101.

Gorely, T., & Gordon, S. (1995). An examination of the transtheoretical model and exercise behavior in older adults. *Journal of Sport and Exercise Psychology, 17*, 312-324.

Grierson, R. M. (2005). *Does regular physical activity influence academic performance in incoming freshmen students at Delta State University?* Ed.D., Delta State University, United States -- Mississippi. Retrieved from http://proquest.umi.com/pqdweb?did=932370331&Fmt=7&clientId=18803&RQT=309&VName=PQD

Grodesky, J. M., Kosma, M., & Solmon, M. A. (2006). Understanding Older Adults' Physical Activity Behavior: A Multi-Theoretical Approach. *Quest (00336297), 58*(3), 310-329.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis* (5th ed.). New Jersey: Prentice Hall.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: a global perspective.* (7th ed.). New Jersey.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, N.J.: Pearson Prentice Hall.

Haskell, W. L., Leon, A. S., Caspersen, C. J., Froelicher, V. F., Hagberg, J. M., Harlan, W., . . . Washburn, R. A. (1992). Cardiovascular benefits and assessment of physical activity and physical fitness in adults. *Medicine And Science In Sports And Exercise, 24*(6 Suppl), S201-220.

Hayes, S. D., Crocker, P. R. E., & Kowalski, K. C. (1999). Gender Differences in Physical Self-Perceptions, Global Self-Esteem and Physical Activity: Evaluation of the Physical Self-Perception Profile Model. *Journal of Sport Behavior, 22*(1), 1.

Heather, A. H., Claudio, R. N., Danielle Symons, D., David, S. F., & Daniel, P. C. (2002). Perceptions of exercise stages, barrier self-efficacy, and decisional balance for middle-level school students. *The Journal of Early Adolescence, 22*(4), 436.

Ho, R. (2006). *Handbook of univariate and multivariate data analysis and interpretation with SPSS*. Boca Raton, FL.: Taylor & Francis Group.

Howell, D. C. (2007). *Statistical Methods for Psychology* (6th ed.). Belmont, CA: thomson Wadsworth.

Hwang, H., & Kim, Y. H. (2011). Adolescents' physical activity and its related cognitive and behavioural processes. *Biology of sport, 28*(1), 19-22.

Institute for Public Health. (1999). The national health and morbidity survey II,1996: Exercise among adults aged 18 years and above (Vol. 13). Kuala Lumpur: Ministry of Health, Malaysia.

Institute for Public Health. (2008). The third national health and morbidity survey (NHMS III) 2006, Physical Activity. (Vol. Topic 10). Kuala Lumpur: Ministry of Health, Malaysia.

Jordan, P. J., Nigg, C. R., Norman, G. J., Rossi, J. S., & Benisovich, S. V. (2002). Does the transtheoretical model need an attitude adjustment?: Integrating attitude with decisional balance as predictors of stage of change for exercise. *Psychology of Sport and Exercise, 3*(1), 65-83.

Juniper, K. C., Oman, R. F., Hamm, R. M., & Kerby, D. S. (2004). The Relationships Among Constructs in the Health Belief Model and the Transtheoretical Model Among African-American College Women for Physical Activity. *American Journal of Health Promotion, 18*(5), 354-357.

Katzmarzyk, P. T. (2007). Physical Activity and Fitness with Age among Sex and Ethnic Groups. In C. Bouchard, S. N. Blair & W. Haskell, L. (Eds.), *Physical Activity and Health*. Champaign, IL: Human Kinetics.

Keating, X. D., Jianmin, G., Pinero, J. C., & Bridges, D. M. (2005). A Meta-Analysis of College Students' Physical Activity Behaviors. *Journal of American College Health, 54*(2), 116-125.

Kee, K. M., Ong, T. F., & Wee, E. H. (2010). *Exercise behavior of Malaysian Secondary School students: A transtheoretical model approach.* Faculty of Sport Science and Recreation. Universiti Teknologi MARA. Shah Alam.

Kendzierski, D. (1990). Exercise self-schemata: Cognitive and behavioral correlates. *Health Psychology, 9*(1), 69-82.

Khoo, S. (2005). *Sport for All in Malaysia: Policy & Practice*. Kuala Lumpur: University Malaya Press.

Kim, Y.-h. (2004). Korean adolescents' exercise behavior and its relationship with psychological variables based on stages of change model. *Journal of Adolescent Health, 34*(6), 523-530.

Kim, Y.-H. (2007). Application of the transtheoretical model to identify psychological constructs influencing exercise behavior: A questionnaire survey. *International Journal of Nursing Studies, 44*(6), 936-944.

Kim, Y., Cardinal, B., & Lee, J. (2006a). Understanding exercise behavior among korean adults: a test of the transtheoretical model. *International Journal of Behavioral Medicine, 13*(4), 295-303. doi: 10.1207/s15327558ijbm1304_4

Kim, Y., & Cardinal, B. J. (2010). Psychological correlates of Korean Adolescents' Physical Activity Behavior. *Journal of Exercise Science and Fitness, 8*(2), 97-104.

Kim, Y., Cardinal, B. J., & Lee, J. (2006b). Understanding exercise behavior among Korean adults: a test of the Transtheoretical Model. *International Journal of Behavioral Medicine, 13*(4), 295-303.

Kinnear, P. R., & Gray, C., D. (2006). *SPSS 14 Made Simple*. NY: Psychology Press.

Kline, R., B. (2005). *Principles and practice of structural equestion modeling* (2nd ed.). New York: The Guilford Press.

Kohl, H. W., Blair, S. N., Paffenbarger, R. S., Macera, C. A., & Kronenfeld, J. J. (1988). A mail survey of physical activity habits as related to measured physical fitness. *American Journal of Epidemiology*, *127*(6), 1228-1239.

Kosma, M., Ellis, R., Cardinal, B. J., Bauer, J. J., & McCubbin, J. A. (2007). The Mediating Role of Intention and Stages of Change in Physical Activity Among Adults with Physical Disabilities: An Integrative Framework. *Journal of Sport & Exercise Psychology, 29*(1), 21-38.

Kung, H. C., Hoyert, D. L., Xu, J. Q., & Murphy, S. L. (2008). Deaths: Final data for 2005. National vital statistics reports; vol 56 no 10 (Vol. 56). Hyattsville, MD: National Center for Health Statistics.

Kylie, B., David, C., & Neville, O. (2000). Too fat to exercise? Obesity as a barrier to physical activity. *Australian and New Zealand Journal of Public Health, 24*(3), 331.

LaMaster, K. J., Mckenzie, T. L., Marshall, S., & Sallis, J. F. (1998). Habitual physical activity of classroom teachers: Does it relate to their conduct of physical education classes? : ERIC.

Langemo, D. K., Volden, C., Oechsle, L., & Adamson, M. (1990). Explicating the relationship of health measures and self-esteem to exercise practices in adults. *Health Education, 21*(4), 7-11;45.

Lee, R. E., Nigg, C. R., DiClemente, C. C., & Courneya, K. S. (2001). Validating motivational readiness for exercise behavior with adolescents. *Research Quarterly for Exercise and Sport, 72*, 401-410.

Leenders, N. Y. J. M., Wallace Silver, L., White, S. L., Buckworth, J., & Sherman, W. M. (2002). Assessment of physical activity, exercise self-efficacy, and stages of change in college students using a street-based survey method. *American Journal of Health Education, 33*(4), 199-205.

Lenny, E. (1977). Women's self-confidence in achievement settings. *Psychological Bulletin, 84*, 1-13.

Leslie, E., Sparling, P. B., & Owen, N. (2001). University campus settings and the promotion of physical activity in young adults: Lessons from research in Australia and the USA. *Health Education, 101*(3), 116.

Levy, S. S., & Cardinal, B. J. (2006). Factors Associated With Transitional Shifts in College Students' Physical Activity Behavior. *Research Quarterly for Exercise & Sport, 77*(4), 476-485.

Lindwall, M., & Hassmen, P. (2004). The role of exercise and gender for physical self-perceptions and importance ratings in Swedish university students. *Scandinavian Journal of Medicine & Science in Sports, 14*(6), 373-380.

Lirgg, C. D., George, T. R., Chase, M. A., & Ferguson, R. H. (1996). Impact of Conception of Ability and Sex-Type of Task on Male and Female Self-Efficacy. [Article]. *Journal of Sport & Exercise Psychology, 18*(4), 426-434.

Little, T. D., Cunningham, W. A., Sahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*(2), 151-173.

Maddison, R., & Prapavessis, H. (2006). Exercise Behavior Among New Zealand Adolescents: A Test of the Transtheoretical Model. *Pediatric Exercise Science, 18*(3), 351-363.

Marcus, B., & Forsyth, L. (2003a). *Motivating people to be physically active*. Champaign, Ill.: Human Kinetics.

Marcus, B. H., Banspach, S. W., Lefebvre, R. C., Rossi, J. S., Carleton, R. A., & Abrams, D. B. (1992a). Using the stages of change model to increase the adoption of physical activity among community participants. *American Journal Of Health Promotion: AJHP, 6*(6), 424-429.

Marcus, B. H., Eaton, C. A., Rossi, J. S., & Harlow, L. L. (1994). Self-efficacy, decision-making, and stages of change: An integrative model of physical exercise. *Journal of Applied Social Psychology, 24*, 489-508.

Marcus, B. H., & Forsyth, L. H. (2003b). *Motivating People To Be Physically Active. Physical Activity Intervention Series*.

Marcus, B. H., & Lewis, B. A. (2003). Physical activities and the stages of motivational readiness for change model *President's council on Physical Fitness and Sports Reseach Digest, Series 4*. Washington, DC.: President's council on Physical Fitness and Sports.

Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992b). Assessing motivational readiness and decision making for exercise. *Health Psychology, 11*(4), 257-261.

Marcus, B. H., Rossi, J. S., Selby, V. C., Niaura, R. S., & Abrams, D. B. (1992c). The stages and processes of exercise adoption and maintenance in a worksite sample. *Health Psychology, 11*(6), 386-395.

Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992d). Self-efficacy and the stages of exercise behavior change. *Research Quarterly for Exercise & Sport, 63*(1), 60-66.

Marcus, B. H., & Simkin, L. R. (1993). The stages of exercise behavior. *Journal of Sports Medicine and Physical Fitness, 33*, 83-88.

Marcus, B. H., & Simkin, L. R. (1994). The transtheoretical model: applications to exercise behavior. *Medicine And Science In Sports And Exercise, 26*(11), 1400-1404.

Marsh, H. W., Hey, J., Roche, L. A., & Perry, C. (1997). Structure of physical self-concept: Elite athletes and physical education students. *Journal of Educational Psychology, 89*(2), 369-380.

Marsh, H. W., Papaioannou, A., & Theodorakis, Y. (2006). Causal Ordering of Physical Self-Concept and Exercise Behavior: Reciprocal Effects Model and the Influence of Physical Education Teachers. *Health Psychology, 25*(3), 316-328.

Marshall, S. J., & Biddle, S. J. H. (2001). The transtheoretical model of behavior change: A meta-analysis of applications to physical activity and exercise. *Annals of Behavioral Medicine, 23*, 229-246.

McAuley, E., Mihalko, S. L., & Bane, S. M. (1997). Exercise and Self-Esteem in Middle-Aged Adults: Multidimensional Relationships and Physical Fitness and Self-Efficacy Influences. *Journal of Behavioral Medicine, 20*(1), 67-83.

McKenzie, T. L., LaMaster, K. J., Sallis, J. F., & Marshall, S. J. (1999). Classroom teachers' leisure physical activity and their conduct of physical education. *Journal of Teaching in Physical Education, 19*(1), 126-132.

Melville, D., & Maddalozzo, J. (1988). The effects of a physical educator's appearance of body fatness on communicating exercise concepts to high school students. *Journal of teaching physical education, 7*, 343-352.

Metzker, A. L. (1999). *The effects of a transtheoretical model physical activity intervention program on the physical activity behavior of female adolescents.* Ed.D., University of Northern Colorado, United States -- Colorado. Retrieved from http://proquest.umi.com/pqdweb?did=729766141&Fmt=7&clientId=28403&RQT=309&VName=PQD

Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research : design and interpretation*. Thousand Oaks: SAGE Publications.

Ministry of Education Malaysia. (1982). Laporan pengajaran Pendidikan Jasmani di sekolah-sekolah daerah Klang, Selangor. (Report on the teaching of Physical education in schools in Klang Districts, Selangor). Kuala Lumpur: Federal Inspectorate of schools, Ministry of Education Malaysia.

Ministry of Education Malaysia. (1990). Laporan pengajaran Pendidikan Jasmani di sekolah menengah (Report on the teaching of Physical education in secondary schools). Kuala Lumpur: Federal Inspectorate of Schools, Ministry of Education Malaysia.

Ministry of Education Malaysia. (1993). Laporan pengesanan KBSM: Pendidikan Jasmani dan kesihatan (Report on Secondary school integrated curriculum: Physical and Health education). Kuala Lumpur: Federal Inspectorate of Schools, Ministry of Education Malaysia.

Ministry of Education Malaysia. (2006). Pelan Induk Pembangunan Pendidikan (Education Development Master Plan) Kuala Lumpur: Education Planning Policy Research Division.

Ministry of Health Malaysia. (2006). NCD risk factors in Malaysia. Putrajaya: Noncommunicable Disease Section (NCD), Disease Control Division, Ministry of Health, Malaysia.

Ministry of Health Malaysia. (2007). Seminar on Findings of Malaysian Adult Nurtition Survey (MANS 2003) *Kuala Lumpur*: Nutrition Section, Family Health Development Division.

Mitchell, M., & Jolley, J. (2004). *Research design explained* (5th ed.). Belmont: Wadsworth/Thomson Learning.

Moreno, J. A., & Cervello, E. (2005). Physical self-perceptions in Spanish adolescents: Gender and involvement in physical activity effects. *Journal of Human Movement Studies, 48*, 291-311.

Morgan, P. P., Shephard, R. J., Finucane, R., Schimmelfing, L., & Jazmaji, V. (1984). Health beliefs and exercise habits in an employee fitness programme. *Canadian Journal Of Applied Sport Sciences. Journal Canadien Des Sciences AppliquÃ©es Au Sport, 9*(2), 87-93.

Morris, M., & Salmon, P. (1994). Qualitative and quantitative effects of running on mood. *Journal of Sports Medicine & Physical Fitness, 34*, 284-291.

Murphy, D. (1993). Application of the transtheoretical model to exercise adherence. Eugene, Ore.; United States: Microform Publications, College of Human Development and Performance, University of Oregon.

Myers, R. S., & Roth, D. L. (1997). Perceived Benefits of and Barriers to Exercise and Stage of Exercise Adoption in Young Adults. *Health Psychology, 16*(3), 277-283.

Nahas, M. V., Goldfine, B., & Collins, M. A. (2003). Determinants of Physical Activity in Adolescents and Young Adults: The Basis for High School and College Physical Education to Promote Active Lifestyles. *Physical Educator, 60*(1), 42.

Nieman, D. C. (1999). *Exercise testing and prescription : a health-related approach* (4th ed.). Mountain View, Calif.: Mayfield Pub.

Nigg, C. R. (1996). *Understanding adolescent exercise behaviour: An application of the transtheoretical model.* M.Sc., University of Calgary (Canada), Canada. Retrieved from http://proquest.umi.com/pqdweb?did=740486851&Fmt=7&clientId=28403&RQT=309&VName=PQD

Nigg, C. R. (2001). Explaining adolescent exercise behavior change: A longitudinal application of the transtheoretical model. *Annals of Behavioral Medicine, 23*, 11-20.

Nigg, C. R. (2003). Do sport participation motivations add to the ability of the Transtheoretical Model to explain adolescent exercise behavior? *International Journal of Sport Psychology, 34*(3), 208-225.

Nigg, C. R., & Courneya, K. S. (1998). Transtheoretical model: Examining adolescent exercise behavior. *Journal of Adolescent Health, 22*(3), 214-224.

Nigg, C. R., Hellsten, L., Norman, G., Braun, L., Breger, R., Burbank, P., . . . Welk, G. (2005). Physical Activity Staging Distribution: Establishing a Heuristic Using Multiple Studies. *Annals of Behavioral Medicine, 29*, 35-45.

Omar-Fauzee, M. S., & Hamdan, M. A. (2004). The Transtheoretical Model Re-assessed: An examination of exercise behavior in Malaysian High School students. *Journal of the International Council for Health, Physical Education, Recreation, Sport & Dance, XL*(3), 29-33.

Paschal, A., Lewis-Moss, R., Sly, J., & White, B. (2010). Addressing health disparities among African Americans: using the Stages of Change Model to document attitudes and decisions about nutrition and physical activity. *Journal of Community Health, 35*(1), 10-17. doi: http://dx.doi.org/10.1007/s10900-009-9197-x

Patterson, E., McGeough, D., Cannon, E., Hagstromer, M., Bergman, P., Kearney, J., & Sjostrom, M. (2006). Self-efficacy, stages of change and physical activity in Irish college students. *Journal of Public Health, 14*(2), 81-86.

Paxton, R. J., Nigg, C. R., Motl, R. W., McGee, K., McCurdy, D., Matthai, C. H., & Dishman, R. K. (2008). Are constructs of the transtheoretical model for physical activity measured equivalently between sexes, age groups, and ethnicities? [Article]. *Annals of Behavioral Medicine, 35*(3), 308-318. doi: 10.1007/s12160-008-9035-x

Petruzzello, S. J., Landers, D. M., Hatfield, B. D., Kubitz, K.A., , & Salazar, W. (1991). A meta-analysis on the anxiety-reducing effects of acute and chronic exercise. Outcomes and mechanisms. . *Sports Medicine, 11*, 143-182.

Plotnikoff, R. C., Hotz, S. B., Birkett, N., & Courneya, K. S. (2001). Exercise and the Transtheoretical Model: A longitudinal test of a population sample. *Preventive Medicine, 33*, 441-452.

Prapavessis, H., Maddison, R., & Brading, F. (2004). Understanding exercise behavior among New Zealand adolescents: A test of the Transtheoretical Model. *Journal of Adolescent Health, 35*(4), 346.e317-346.e317.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change in smoking toward an integrative model of change. *Journal of Consulting Clinical Psychology, 5*, 390-395.

Prochaska, J. O., & Marcus, B. H. (1994). The transtheoretical model: Applications to exercise. In R. K. Dishman (Ed.), *Advances in exercise adherence* (pp. (161-180)). Champaign, IL: Human Kinetics.

Reed, G. R. (1999). Adherence to exercise and the transtheoretical model of behavior change. In S. J. Bull (Ed.), *Adherence issues in sport and exercise* (pp. 19-45). Chichester, West Sussex, England Wiley.

Rosen, C. S. (2000a). Integrating Stage and Continuum Models to Explain Processing of Exercise Messages and Exercise Initiation Among Sedentary College Students. *Health Psychology*, *19*(2), 172-180.

Rosen, C. S. (2000b). Is the Sequencing of Change Processes by Stage Consistent Across Health Problems? A Meta-Analysis. *Health Psychology, 19*(6), 593-604.

Sachs, M. L. (1982). Running therapy: Change agent in anxiety and stress management. *Journal of Physical Education, Recreation & Dance, 53*(10), 44-45.

Sallis, J. F. (1993). Epidemiology of physical activity and fitness in children and adolescents. *Critical Reviews in Food Science and Nutrition., 33*, 405-408.

Sallis, J. F., Hovell, M. F., Hofstetter, C. R., & Barrington, E. (1992). Explanation of vigorous physical activity during two years using social learning variables. *Social Science & Medicine, 34*(1), 25-32.

Sallis, J. F., & Owen, N. (1999). *Physical activity & behavioral medicine* Thousand Oaks, CA: Sage.

Sas-Nowosielski, K. (2007). Leisure-time physical activity of adolescents within the framework of the transtheoretical model. *Studies in Physical Culture & Tourism, 14*(1).

Schoenborn, C. A. (1986). Health habits of U.S. adults:"The Alameda 7" revisited. *Public Health Reports, 101* 571-580.

Schwalbe, M. L., & Staples, C. L. (1991). Gender Differences in Sources of Self-Esteem. *Social Psychology Quarterly, 54*(2), 158-168.

Siconolfi, S. F., Lasater, T. M., Snow, R. C., & Carleton, R. A. (1985). Self-reported physical activity compared with maximal oxygen uptake. *American Journal of Epidemiology, 122*(1), 101-105.

Solmon, M. A., Lee, A. M., Belcher, D., Harrison, L., & Wells, L. (2003). Beliefs about Gender Appropriateness, Ability, and Competence in Physical Activity. *Journal of Teaching in Physical Education, 22*(3), 261-279.

Sonstroem, R. J. (1988). *Psychological models. In: Dishman R.K., (ed.).Exercise adherence : its impact on public health*. Champaign, Ill.: Human Kinetics Books.

Sonstroem, R. J., Speliotis, E. D., & Fava, J. L. (1992). Perceived Physical Competence in Adults: An Examination of the Physical Self-Perception Profile. *Journal of Sport & Exercise Psychology*, *14*(2), 207.

Stathi, A., Fox, K. R., & McKenna, J. (2002). Physical activity and dimensions of subjective well-being in older adults. *Journal of Aging and Physical Activity 10*, 76-92.

Sullum, J., & Clark, M. M. (2000). Predictors of Exercise Relapse in a College Population. *Journal of American College Health, 48*(4), 175.

Suminski, R. R., & Petosa, R. (2002). Stages of Change Among Ethnically Diverse College Students. *Journal of American College Health, 51*(1), 26.

Sung, D. (2003). *Assessing exercise behavior of South Dakota public university faculty using the transtheoretical model.* Ed.D., University of South Dakota, United States -- South Dakota. Retrieved from http://proquest.umi.com/pqdweb?did =729766141&Fmt=7&clientId=28403&RQT=309&VName=PQD

Tabachnick, B. G., & Fidell, L. S. (2001) *Usingmultwariate statistics B2 - Usingmultwariate statistics* (Vol. 4th). Boston: Allyn and Bacon.

Talbot, L. A., Metter, E. J., & Fleg, J. L. (2000). Leisure-time physical activities and their relationship to cardiorespiratory fitness in healthy men and women 18-95 years old. *Medicine and Science in Sports and Exercise*, *32*, 417-425.

Tan, S. E. (1991). *The attitude of the University of Malaya Diploma in education teacher trainees towards physical activity.* M Ed, University of Malaya, Kuala Lumpur.

Trost, S. G., Pate, R. R., Dowda, M., Saunders, R., Ward, D. S., & Felton, G. (1996). Genders differences in physical activity in rural fifth grade children. *Journal of School Health., 66*, 145-150.

U.S. Department of Health and Human Services. (1996). Physical activity and health: A report of the surgeon general. Atlanta, GA.: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.

U.S. Department of Health and Human Services. (2000). Physical activity and fitness. *Healthy People 2010*.

U.S. department of Health and Human Services, P. H. S., National Center for Chronic Diesease Prevention, Division of Nutrition and Physical Activity. (1999). *Promoting Physical Activity: A guide for community action*. Champaign, IL.: Human Kinetics.

van Mechelen, W., & Kemper, H. C. G. (1995). Habitual physical activity in longitudinal perspective. In H.C.G. Kemper (Ed.) *The Amsterdam growth study: A longitudinal analysis of health, fitness, and lifestyle (pp. 15-158)*. Champaign, IL: Human Kinetics.

Vuori, I. (1995). Exercise and physical health: musculoskeletal health and functional capabilities. *Research Quarterly for Exercise and Sport, 66*(4), 276-285.

Wadsworth, D. D., & Hallam, J. S. (2007). The Use of the Processes of Change Across the Exercise Stages of Change and Across Varying Intensities and Frequencies of Exercise Behavior. *American Journal of Health Promotion, 21*(5).

Wan Hasmah, W. M., & Zainun, I. (2002). Values in school physical education. *Malaysian Association of Physical education, Sport Science and Fitness, 2*, 1-6.

Wee, E. H. (2001). *Attitude of physical education teachers toward physical education and implementation of physical education programme in secondary schools.* PhD, University Malaya, Kuala Lumpur.

Wee, E. H. (2008). Innovative practices in physical education and sports in Asia (pp. 22-40). Bangkok: Asia-Pacific Programme of Education Innovation for Development, United Nations Education, Scientific and Cultural Organization.

Welk, G. J., Corbin, C. B., Dowell, M. N., & Harris, H. (1997). The validity and reliability of two different versions of the Children and Youth Physical Self-Perception Profile. *Measurement in Physical Education & Exercise Science, 1*(3), 163-177.

Welk, J. G. (1999). The youth physical activity promotion model: a conceptual bridge between theory and practice.

Whitehead, J. R. (1995). A study of children's physical self-perceptions using an adapted Physical Self-Perception Profile questionnaire. *Pediatric Exercise Science, 7*(2), 132-151.

Whitley, J., Sage. J., & Butcher, M. (1988). Cardiorespiratory fitness: Role modeling by PE instructors. *Journal of Physical Education, Recreation & Dance, 59(7),* 81-84.

WHO. (2003). Health and development through physical activity and sport.

Willis, J. D., & Campbell, L. F. (1992). *Exercise Psychology*. Champaign, IL: Human Kinetics Publishers.

Wuest, D. A., & Bucher, C. A. (2003). *Foundations of physical education, exercise science, and sport* (14th ed.). New York: McGraw-Hill.

Wyse, J., Mercer, T., Ashpord, B., Buxton, K., & Gleeson, N. (1995). Evidence for the validity and utility of the stages of exercise behaviour change scale in young adults. *Health Education Research, 10*, 365-377.

APPENDIX

Appendix A1: Maklumat Demografik (DQ – Bahasa Malaysia Version)

Sila tandakan (✓) atau isikan tempat kosong dengan maklumat yang relevan.

	No Siri:	:_____	
1.	*Jantina*	: *lelaki* : *perempuan*	( ) ( )
2.	*Umur*	:_____ *tahun*	
3.	*Keturunan*	: *Melayu*	( )
		: *Cina*	( )
		: *India*	( )
		:*Lain-lain (sila nyatakan)*	:_____
4.	*Ketinggian*	:_____cm	
5.	*Berat badan*	:_____kg	
6.	*Nama Institut:*	:_____	
7.	*Jenis program*:	:_____	
8.	*Tumpuan/Pengkhususan*	:_____	
9.	*Peringkat program pengajian*	: *Sijil*	( )
		: *Diploma*	( )
		: *Ijazah*	( )
		: *Lain-lain*	( )
10.	*Semester pengajian:*	(1) (2) (3) (4) (5) (6)	
11.	*Kelayakan diguna untuk masuk Latihan perguruan*	*SPM*	( )
		STPM	( )
		Diploma	( )
		Ijazah	( )
		Lain-lain	( )
	Jika lain kelayakan digunakan, sila nyatakan	:_____	
	Adakah program ini pilihan anda?	*Ya* …….. ( ) *Tidak, pilihan saya adalah* (_____)	
12.	*Negeri Asal:*	:_____	
13.	*Daerah :*	:_____	
14.	*Bandar* :	:_____	

15.	*Lokasi sekolah menengah yang lepas:*	*Kawasan Bandar …….....* ( ) *Kawasan Luar Bandar……* ( )
16.	*Jenis sekolah*	*a) Sekolah Biasa ……..... ( )* *b) Sekolah Asrama Penuh …. ( )* *c) Sekolah Agama …….. ( )* *d) Sekolah Persendirian …… ( )* *e) Lain-lain…….. ( )* *(sila nyatakan jika lain-lain)* :_____
17.	*Anda aktif dalam sukan semasa di sekolah?*	*Ya* ….. ( ) *Tidak* … ( )
18.	*Jika ya, jenis sukan:*	:_____
19.	*Peringkat penglibatan sukan di sekolah:*	*Wakili Rumah Sukan…....* ( ) *Wakili Sekolah ……..…..* ( ) *Wakili Daerah ……* ( ) *Wakili Negeri ..……..…..* ( ) *Wakil Negara ……* ( )
20.	*Adakah anda kini masih aktif dalam sukan?*	*Ya* ……. ( ) *Tidak* …… ( )
21.	*Jika masih aktif, nyatakan peringkat penglibatan sekarang (cth. wakili institusi, persatuan sukan, negeri, negara dll.)* :_____	

Appendix A2: Demographic Data (DQ – English Version)

Please tick (✓) or fill the empty spaces with the relevant information

	Serial No.	:_____	
1.	Gender	:Male :Female	( ) ( )
2.	Age	:_____ years old	
3.	Ethnicity	:Malay	( )
		:Chinese	( )
		:Indian	( )
		:Other *(state)*	:_____
4.	Height	:_____cm	
5.	Weight	:_____kg	
6.	Name of Institute	:_____	
7.	Type of Program:	:_____	
8.	Major /Specialization:	:_____	
9.	Level of program	:Cert.	( )
		:Diploma	( )
		:Degree	( )
		:Others	( )
10.	Year attended	(1) (2) (3) (4) (5) (6)	
11.	Qualification use for teacher training entry /	SPM	( )
		STPM	( )
		Diploma	( )
		Degree	( )
		Others	( )
	If other, state the qualification	:_____	
	Is this program your choice?	Yes ….. ( ) No , *my choice is* (_____)	
12.	State of Origin	:_____	
13.	District	:_____	
14.	Hometown	:_____	

15.	Previous Secondary School Location	Urban ……..... ( ) Rural ..…...……...…. ( )
16.	Type of school	a) Normal school ...…….…..... ( ) b) Residential school ..…….…... ( ) c) Religious school ...…….…… ( ) d) Private school …..…..…… ( ) e) Others ……..…….... ....( ) (state if others) :_____
17.	Are you active in sport during school days?	Yes ……... ( ) No ..…… ( )
18.	If yes, which sport	:_____
19.	Level of sport involvement in school	Represent Sport House…..... ( ) Represent School …….. ( ) Represent District…….…..... ( ) Represent State ...…….…..... ( ) Represent National …… ( )
20.	Are you still active in sport now?	Yes ……. ( ) No ..…… ( )
21.	If still active, state your current involvement level eg. Representing institute, sport association, state,country etc :_____	

Appendix B1: Soal Selidik Senaman Masa Lapang

1. Dalam tempoh masa 7 hari (seminggu), berapa kali secara purata anda melakukan aktiviti senaman seperti di bawah selama melebihi 15 minit dalam masa lapang anda? *Tulis angka dalam kotak yang disediakan*.

	Bilangan kali seminggu
Senaman berat (jantung denyut dengan pantas) (seperti berlari, berjoging, bermain bola sepak, bermain bola keranjang, merentas desa, berenang pantas, aktiviti aerobik yang rancak)	
Senaman sederhana (aktiviti yang tidak begitu memenatkan) (seperti berjalan pantas, bermain besbol, sofbol, tenis, berbasikal, bermain bola tampar, badminton, menari, berenang dengan kelajuan yang sederhana, bermain ping pong)	
Senaman ringan (usaha yang minimum) (seperti yoga, memanah, memancing, bermain boling, golf, berjalan kaki)	

2. Dalam tempoh masa 7 hari (seminggu), berapa kerap anda melakukan aktiviti fizikal yang cukup untuk mengeluarkan peluh, dan membuatkan jantung anda berdenyut dengan kuat dan pantas? *Sila tandakan (√) pada kotak yang memberikan gambaran terbaik.*

Sering kali	
Kadangkala	
Jarang-jarang sekali / tidak pernah	

Appendix B2: Leisure Time Exercise Questionnaire

1. Considering a 7-day period (a week), how many times on average do you do the following kinds of exercise for more than 15 minutes at a time duirng your free (leisure) time? *Write the appropriate in the number corresponding box.*

	Times per week
Strenuous exercise (heart beats rapidly) (example: running, jogging, soccer, basketball, cross country, vigorous swimming, vigorous aerobics)	
Moderate exercise (not exhausting) (example: fast walking, softball, tennis, easy cycling, volleyball, badminton, easy swimming, dancing, table tennis)	
Mild exercise (minimum effort) (example: yoga, archery, bowling, golf, easy walking)	

2. Considering a 7-day period (a week), during your leisure-time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)? *Please tick (√) on the appropriate box that best described your situation.*

Often	
Sometimes	
Never/Rarely	

Appendix C1: Soalselidik Peringkat Perubahan Senaman (SECQ - Bahasa Malaysia Version)

Senaman tetap ialah aktiviti fizikal yang telah dirancang (seperti berjalan kaki, aerobik, berjoging, berbasikal, renang, mendayung dan sebagainya) yang dilakukan untuk meningkatkan activiti fizikal. Aktiviti-aktiviti ini perlu dilakukan sebanyak 3 hingga 5 kali seminggu selama 20 hingga 60 minit setiap sesi. Senaman tidak perlu hingga rasa sakit untuk berkesan tetapi perlu dilakukan pada tahap yang dapat meningkatkan kadar pernafasan dan menyebabkan berpeluh.

Sila tandakan (√) pada pernyataan yang memberikan gambaran terbaik mengenai tahap senaman anda pada masa kini berdasarkan kepada 5 pernyataan di bawah. ***Pilih hanya satu.***

Pernyataan		**Respon**
1	*Saya tidak bersenam buat masa kini semasa waktu lapang, dan saya tidak bercadang untuk bersenam dalam 6 bulan akan datang.*	
2	*Saya tidak bersenam buat masa kini semasa waktu lapang, tetapi saya bercadang untuk memulakan senaman dalam 6 bulan akan datang.*	
3	*Saya ada melakukan sedikit senaman buat masa kini semasa waktu lapang, tetapi tidak kerap melakukannya.*	
4	*Saya kerap bersenam buat masa kini semasa waktu lapang, tetapi saya hanya mula melakukannya dalam 6 bulan yang terakhir.*	
5	*Saya kerap bersenam buat masa kini semasa waktu lapang, dan telahpun bersenam untuk lebih dari 6 bulan.*	

Appendix C2: Stages Of Exercise Change Questionnaire (SECQ - English Version)

Regular exercise is any planned physical activity (e.g. brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical activity. Such activity should be performed 3 to 5 times per week for 20 to 60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.

Please tick (√) the statement that best describes your current level of exercise based on the 5 statements as stated below. **Choose only one.**

Statements		**Response**
1	I currently do not exercise in my leisure time, and I do not intend to start exercising in the next 6 months.	
2	I currently do not exercise in my leisure time, but I am thinking about starting to exercise in the next 6 months.	
3	I currently do engage in some exercise in my leisure time, but not regularly.	
4	I currently exercise regularly in my leisure time, but I have only begun doing so within the last 6 months.	
5	I currently exercise regularly in my leisure time, and have done so for longer than 6 months.	

Appendix D1: Soalselidik Keberkesanan Diri (SEQ - Bahasa Malaysia Version)

Setiap pernyataan mewakili keadaan atau situasi yang mungkin menghalang anda untuk bersenam semasa waktu lapang. Sila beri respon anda kepada pernyataan-pernyataan dibawah dengan menggunakan skala Likert 5 mata seperti berikut:

Setiap pernyataan perlu dimulakan dengan ayat 'Saya yakin saya dapat melibatkan diri dalam senaman apabila ….'.

*Sebagai contoh: " **Saya yakin saya dapat melibatkan diri dalam senaman apabila saya penat**"*

Skala:

1 = *tiada keyakinan langsung*

2 = *sedikit yakin*

3 = *sederhana yakin*

4 = *yakin*

5 = *yakin sepenuhnya*

Pernyataan Saya yakin saya dapat melibatkan diri dalam senaman bila /semasa ……..	***Respon***				
1. Saya penat.	**1**	**2**	**3**	**4**	**5**
2. Suasana perasaan (mood) saya tidak baik.	**1**	**2**	**3**	**4**	**5**
3. Saya merasakan saya tidak ada masa.	**1**	**2**	**3**	**4**	**5**
4. Saya sedang bercuti.	**1**	**2**	**3**	**4**	**5**
5. Hari hujan, sejuk atau sangat panas.	**1**	**2**	**3**	**4**	**5**
6. Saya ada kerja rumah untuk dibuat.	**1**	**2**	**3**	**4**	**5**
7. Kawan-kawan saya mengajak saya keluar	**1**	**2**	**3**	**4**	**5**
8. Saya perlu membersihkan rumah.	**1**	**2**	**3**	**4**	**5**
9. Ada rancangan menarik sedang ditayangkan di TV.	**1**	**2**	**3**	**4**	**5**
10. Saya bersendirian.	**1**	**2**	**3**	**4**	**5**

Appendix D2: Self-Efficacy Questionnaire (SEQ - English Version)

Each statement represents a condition or situation that may get in your way to exercise during your leisure time. Please respond to the following statements by using a 5 point Likert Scale as stated below:

Each statement should begin with "I am confident I can participate in regular exercise when …"

For example, "**I am confident I can participate in regular exercise when I am tired**."

***Scale*:**

1 = not at all confident

2 = somewhat confident

3 = moderately confident

4 = confident

5 = completely confident

Statement I am confident I can participate in regular exercise when …….	**Response**				
1. I am tired.	**1**	**2**	**3**	**4**	**5**
2. I am in a bad mood.	**1**	**2**	**3**	**4**	**5**
3. I feel I don't have the time.	**1**	**2**	**3**	**4**	**5**
4. I am on vacation.	**1**	**2**	**3**	**4**	**5**
5. It is raining, cold or hot.	**1**	**2**	**3**	**4**	**5**
6. I have homework to do.	**1**	**2**	**3**	**4**	**5**
7. My friends call me to go out.	**1**	**2**	**3**	**4**	**5**
8. I need to do house chores.	**1**	**2**	**3**	**4**	**5**
9. There is a good TV show on.	**1**	**2**	**3**	**4**	**5**
10. I am on my own.	**1**	**2**	**3**	**4**	**5**

Appendix E1: Soalselidik Imbangan Membuat Keputusan (DBQ - Bahasa Malaysia Version)

Bahagian ini melihat aspek-aspek positif dan negatif senaman. Sila baca peryataan di bawah dan nyatakan kepentingan setiap pernyataan itu kepada anda dalam membuat keputusan sama ada untuk bersenam atau tidak semasa waktu lapang anda. Sila beri respon anda kepada pernyataan-pernyataan dibawah dengan menggunakan skala Likert 5 mata seperti berikut:-

Skala:

1 = tidak penting langsung

2 = sedikit penting

3 = sederhana penting

4 = penting

5 = sangat penting

Pernyataan	Respon				
1. Saya akan mempunyai tenaga yang lebih untuk kawan-kawan dan keluarga saya jika saya bersenam dengan kerap.	1	2	3	4	5
2. Bersenam selalu membantu saya melegakan tekanan.	1	2	3	4	5
3. Saya akan berasa lebih berkeyakinan jika saya selalu bersenam.	1	2	3	4	5
4. Saya akan dapat tidur dengan lebih nyenyak jika saya bersenam selalu.	1	2	3	4	5
5. Saya akan berasa elok tentang diri saya jika saya terus kekalkan komitmen saya untuk bersenam selalu.	1	2	3	4	5
6. Saya lebih menghargai/sayang tubuh badan saya jika saya bersenam selalu.	1	2	3	4	5
7. Adalah lebih mudah untuk saya melakukan tugas-tugas fizikal harian sekiranya saya bersenam selalu.	1	2	3	4	5
8. Saya akan berasa kurang tekanan jika bersenam selalu.	1	2	3	4	5
9. Saya akan merasa lebih selesa dengan badan saya jika saya bersenam selalu.	1	2	3	4	5

10. Selalu bersenam akan membantu saya berpandangan yang positif terhadap kehidupan.	1	2	3	4	5
11. Saya rasa saya akan terlalu penat untuk melakukan kerja harian selepas melakukan senaman.	1	2	3	4	5
12. Adalah susah untuk saya mencari aktiviti senaman yang saya suka yang tidak di pengaruhi oleh keadaan cuaca buruk.	1	2	3	4	5
13. Saya berasa tidak selesa bila bersenam kerana sukar bernafas dan jantung saya berdenyut dengan pantas.	1	2	3	4	5
14. Bersenam selalu akan mengambil banyak masa saya.	1	2	3	4	5
15. Saya akan hanya dapat sedikit masa sahaja bersama rakan-rakan dan keluarga jika saya selalu bersenam.	1	2	3	4	5
16. Pada penghujung hari, saya terlalu letih untuk melakukan senaman.	1	2	3	4	5

Appendix E2: Decisional Balance Questionnaire (DBQ - English Version)

This section looks at the positive and negative aspects of exercise. Read the following statements and indicate how important each statement is with respect to your decision to exercise or not to exercise in your leisure time. Please respond to the following items below by using a 5 point Likert Scale as stated below:

Scale:

1 = not at all important

2 = somewhat important

3 = moderately important

4 = important

5 = extremely important

Statement	Response				
1. I would have more energy for my friends and family if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
2. Regular exercise would help me relieve tension.	**1**	**2**	**3**	**4**	**5**
3. I would feel more confident if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
4. I would sleep more soundly if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
5. I would feel good about myself if I kept my commitment to exercise regularly.	**1**	**2**	**3**	**4**	**5**
6. I would like my body better if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
7. It would be easier for me to perform routine physical tasks if I exercise regularly.	**1**	**2**	**3**	**4**	**5**
8. I would feel less stressed if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
9. I would feel more comfortable with my body if I exercised regularly.	**1**	**2**	**3**	**4**	**5**

10.	Regular exercise would help me have a good positive outlook on life.	**1**	**2**	**3**	**4**	**5**
11.	I think I would be too tired to do my daily work after exercising.	**1**	**2**	**3**	**4**	**5**
12.	I would find it difficult to find an exercise activity which I enjoy that is not affected by bad weather.	**1**	**2**	**3**	**4**	**5**
13.	I feel uncomfortable when I exercise because I get out of breath and my heart beats very fast.	**1**	**2**	**3**	**4**	**5**
14.	Regular exercise would take too much of my time.	**1**	**2**	**3**	**4**	**5**
15.	I would have less time for my friends and family if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
16.	At the end of the day, I am too exhausted to exercise.	**1**	**2**	**3**	**4**	**5**

Appendix F1: Soalselidik Proses Perubahan (PCQ - Bahasa Malaysia Version)

Pengalaman-penglaman di bawah mungkin memberikan kesan ke atas tabiat senaman sesetengah orang. Sila fikirkan tentang pengalaman yang hampir sama seperti di dalam pernyataan di bawah yang pernah anda alami sekarang atau ***pada tempohmasa satu bulan yang lepas****. Kemudian nyatakan berapa kerap perkara itu berlaku kepada diri anda. Sila gunakan skala Likert 5-mata seperti berikut:*

Skala:
1 = ***tidak pernah***
2 = ***jarang sekali***
3 = ***kadang-kala***
4 = ***kerap***
5 = ***berulang-ulang kali***

Pernyataan	***Respon***				
1. Saya mengingati kembali maklumat-maklumat yang diberikan kepada saya secara peribadi tentang kebaikan bersenam.	1	2	3	4	5
2. Saya memikirkan tentang maklumat daripada rencana-rencana dan iklan-iklan tentang bagaimana hendak menjadikan senaman satu amalan biasa dalam hidup saya.	1	2	3	4	5
3. Saya membaca artikel-artikel tentang senaman dengan harapan untuk mengetahui lebih tentangnya.	1	2	3	4	5
4. Saya mencari maklumat-maklumat yang berkaitan dengan senaman.	1	2	3	4	5
5. Amaran tentang betapa bahaya terhadap kesihatan jika tidak beraktiviti menggerakkan emosi saya.	1	2	3	4	5
6. Gambaran dramatik tentang keburukan tidak beraktiviti menggerakkan emosi saya.	1	2	3	4	5
7. Saya bertindak secara emosi tentang amaran-amaran mengenai cara hidup yang tidak aktif.	1	2	3	4	5
8. Saya rasa saya boleh menjadi contoh kepada yang lain jika saya sentiasa bersenam.	1	2	3	4	5

9. Saya tertanya-tanya bagaimana kesan kurang keaktifan diri saya ini kepada orang yang paling rapat dengan saya.	1	2	3	4	5
10. Saya sedar saya berupaya untuk mempengaruhi orang lain untuk lebih sihat jika saya bersenam lebih.	1	2	3	4	5
11. Rakan-rakan rapat saya mungkin akan bersenam lebih kerap jika saya juga bersenam lebih kerap.	1	2	3	4	5
12. Saya berpandangan bahawa idea bersenam selalu akan membuatkan saya lebih sihat dan gembira.	1	2	3	4	5
13. Saya memikirkan tentang apakah yang akan terjadi kepada saya sekiranya saya terus bersenam.	1	2	3	4	5
14. Saya akan berasa kecewa terhadap diri saya apabila saya tidak bersenam.	1	2	3	4	5
15. Saya beranggapan bahawa saya akan lebih berkeyakinan jika saya sentiasa bersenam.	1	2	3	4	5
16. Saya dapati masyarakat kini lebih menggalakkan orang ramai bersenam.	1	2	3	4	5
17. Saya sedar kini semakin ramai orang menggalakkan kita untuk bersenam.	1	2	3	4	5
18. Saya perhatikan bahawa banyak syarikat perniagaan menggalakkan pekerja-pekerjanya supaya bersenam dengan menawarkan kursus-kursus kecergasan dan luangan masa untuk bersenam.	1	2	3	4	5
19. Saya sedar bahawa banyak kelab kesihatan sekarang ada menyediakan perkhidmatan penjagaan kanak-kanak percuma kepada ahli-ahlinya.	1	2	3	4	5
20. Daripada berada dalam keadaan tidak aktif, lebih baik saya melibatkan diri dalam aktiviti fizikal.	1	2	3	4	5

21. Daripada menganggakanp senaman sebagai satu tugasan yang harus dilakukan, saya cuba menggunakannya sebagai masa yang khusus untuk saya relaks dan melegakan segala keresahan harian.	1	2	3	4	5
22. Bila saya letih, saya akan bersenam juga kerana saya tahu saya akan rasa lebih selesa selepas itu.	1	2	3	4	5
23. Bila ketegangan, saya dapati senaman adalah cara yang sangat baik untuk melegakan kerisauan saya.	1	2	3	4	5
24. Saya ada kawan yang boleh diharap apabila saya ada masalah 99mengenai senaman.	1	2	3	4	5
25. Saya ada kawan yang cergas yang menggalakkan saya untuk bersenam apabila saya tidak bersemangat untuk melakukannya.	1	2	3	4	5
26. Saya ada kawan yang menegur saya apabila saya beralasan untuk tidak bersenam.	1	2	3	4	5
27. Saya ada kawan yang memberikan maklum balas tentang senaman saya.	1	2	3	4	5
28. Saya memberi ganjaran kepada diri saya bila saya bersenam.	1	2	3	4	5
29. Saya cuba meletakkan matlamat yang mampu dicapai bagi diri saya daripada meletakkan matlamat yang terlalu tinggi.	1	2	3	4	5
30. Bila saya bersenam, saya memberitahu kepada diri saya bahawa saya telah melakukan sesuatu yang baik kepada diri saya dengan menjaga tubuh badan melalui bersenam.	1	2	3	4	5
31. Saya melakukan sesuatu yang elok kepada diri saya kerana berusaha untuk bersenam lebih.	1	2	3	4	5
32. Saya memberitahu diri saya bahawa saya mampu untuk terus melakukan senaman jika saya mahu.	1	2	3	4	5
33. Saya berkata pada diri saya jika saya cuba dengan bersungguh-sungguh, saya boleh terus bersenam.	1	2	3	4	5

34. Saya memberikan komitmen untuk bersenam.	1	2	3	4	5
35. Saya mengingatkan diri saya bahawa hanya saya yang bertanggungjawab ke atas kesihatan diri dan saya sahaja yang boleh membuat keputusan sama ada saya hendak bersenam atau tidak.	1	2	3	4	5
36. Saya meletakkan sesuatu benda di sekitar rumah saya bagi mengingatkan saya supaya bersenam.	1	2	3	4	5
37. Saya meletak benda-benda di sekitar tempat kerja (sekolah) saya yang boleh mengingatkan saya supaya bersenam.	1	2	3	4	5
38. Saya mengalihkan barang-barang yang boleh mendorong saya menjadi tidak aktif.	1	2	3	4	5
39. Saya elak dari menghabiskan masa yang panjang di tempat-tempat yang boleh mendorong saya menjadi tidak aktif.	1	2	3	4	5

Appendix F2: Process Of Change Questionnaire (PCQ - English Version)

The following experiences can affect the exercise habits of some people. Think of similar experiences you may be currently having or have had **during the past month**. Then rate how frequently the event occurs to you. Please answer using the following 5-point Likert scale:

Scale:

1 = never

2 = seldom

3 = occasionally

4 = often

5 = repeatedly

Statement		Response				
1.	I recall information people have personally given me on the benefits of exercise.	**1**	**2**	**3**	**4**	**5**
2.	I think about information from articles and advertisements to make exercise a regular part of my life.	**1**	**2**	**3**	**4**	**5**
3.	I read articles about exercise in an attempt to learn more about it.	**1**	**2**	**3**	**4**	**5**
4.	I look for information related to exercise.	**1**	**2**	**3**	**4**	**5**
5.	Warnings about health hazards of inactivity move me emotionally.	**1**	**2**	**3**	**4**	**5**
6.	Dramatic portrayals of the evils of inactivity move me emotionally.	**1**	**2**	**3**	**4**	**5**
7.	I react emotionally to warnings of an inactive lifestyle.	**1**	**2**	**3**	**4**	**5**
8.	I feel I would be a better role model for others if I exercise regularly.	**1**	**2**	**3**	**4**	**5**
9.	I wonder how my inactivity affects those people who are close to me.	**1**	**2**	**3**	**4**	**5**

10.	I realize that I might be able to influence others to be healthier if I would exercise more.	**1**	**2**	**3**	**4**	**5**
11.	Some of my close friends might exercise more if I would.	**1**	**2**	**3**	**4**	**5**
12.	I am considering the idea that regular exercise would make me a healthier, happier person to be around.	**1**	**2**	**3**	**4**	**5**
13.	I think about the type of person I will be if I keep exercising.	**1**	**2**	**3**	**4**	**5**
14.	I get frustrated with myself when I don't exercise.	**1**	**2**	**3**	**4**	**5**
15.	I consider the fact that I would feel more confident if I exercised regularly.	**1**	**2**	**3**	**4**	**5**
16.	I find society changing in ways that make it easier for people to exercise.	**1**	**2**	**3**	**4**	**5**
17.	I am aware of more and more people are encouraging exercising these days.	**1**	**2**	**3**	**4**	**5**
18.	I notice that more businesses are encouraging their employees to exercise by offering fitness courses and time off to work out.	**1**	**2**	**3**	**4**	**5**
19.	I am aware that many health clubs now provide free baby-sitting services to their members.	**1**	**2**	**3**	**4**	**5**
20.	Instead of remaining inactive, I engage in some physical activity.	**1**	**2**	**3**	**4**	**5**
21.	Rather than viewing exercise as simply another task to get out of the way, I try to use it as my special time to relax and recover from the day's worries.	**1**	**2**	**3**	**4**	**5**
22.	When I feel tired, I make myself exercise anyway because I know I will feel better afterwards.	**1**	**2**	**3**	**4**	**5**
23.	When I am feeling tense, I find exercise a great way to relieve my worries.	**1**	**2**	**3**	**4**	**5**
24.	I have someone whom I can depend when I am having problems with exercising.	**1**	**2**	**3**	**4**	**5**
25.	I have a healthy friend who encourages me to exercise when I don't feel up to it.	**1**	**2**	**3**	**4**	**5**

26.	I have someone who points out my reasons for not exercising.	**1**	**2**	**3**	**4**	**5**
27.	I have someone who provides feedback about my exercising.	**1**	**2**	**3**	**4**	**5**
28.	I reward myself when I exercise.	**1**	**2**	**3**	**4**	**5**
29.	I try to set realistic goals for myself rather than setting myself up for failure by expecting too much.	**1**	**2**	**3**	**4**	**5**
30.	When I exercise, I tell myself that I'm being good to myself by taking care of my body in this way.	**1**	**2**	**3**	**4**	**5**
31.	I do something nice for myself for making efforts to exercise more.	**1**	**2**	**3**	**4**	**5**
32.	I tell myself I am able to keep exercising if I wanted to.	**1**	**2**	**3**	**4**	**5**
33.	I tell myself that if I try hard enough I can keep exercising.	**1**	**2**	**3**	**4**	**5**
34.	I make commitments to exercise.	**1**	**2**	**3**	**4**	**5**
35.	I remind myself that I am the only one who is responsible for my health and well-being, and that only I can decide whether or not I will exercise.	**1**	**2**	**3**	**4**	**5**
36.	I put things around my home to remind me of exercising.	**1**	**2**	**3**	**4**	**5**
37.	I keep things around my place of work (school) that remind me of exercise.	**1**	**2**	**3**	**4**	**5**
38.	I remove things that contribute to my inactivity.	**1**	**2**	**3**	**4**	**5**
39.	I avoid spending long periods of time in environments that promote inactivity.	**1**	**2**	**3**	**4**	**5**

Appendix G1: Profil Persepsi Fizikal Diri - (PSPP - Bahasa Malaysia Version)

SIAPA DIRI SAYA?

Berikut adalah pernyataan-pernyataan yang boleh menggambarkan tentang diri seseorang. Tiada pernyataan yang betul ataupun salah kerana manusia sememangnya berbeza-beza.

Mula-mula, tentukan pernyataan yang mana satu daripada dua pernyataan adalah lebih jelas menghuraikan diri anda. Kemudian pilih sama ada pernyataan yang dipilih tersebut "**agak benar**" atau "**sangat benar**" BAGI DIRI ANDA.

CONTOH

0.	Ada orang sangat suka persaingan.		ATAU	Orang lain pula tidak suka bersaing.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

Penjelasan

Oleh kerana saya tidak begitu suka bersaing, maka saya akan memilih pernyataan di sebelah kanan dan memilih C – "agak benar bagi saya". Sekiranya saya sangat suka persaingan, maka saya akan memilih pernyataan di sebelah kiri saya dan kemudiannya memilih jawapan A – "sangat benar bagi saya".

INGAT: PILIH HANYA SATU JAWAPAN SAHAJA – sama ada A, B, C, atau D.

1.	Sesetengah orang rasa diri mereka tidak begitu mahir dalam bersukan.		ATAU	Sesetengah orang pula rasa diri mereka sangat mahir dalam hampir semua jenis sukan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
2.	Sesetengah orang tidak begitu yakin dengan tahap kecergasan fizikal mereka.		ATAU	Sesetengah orang pula selalu rasa yakin dapat mengekalkan tahap kecergasan fizikal mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

3.	Sesetengah orang rasa diri mereka bertubuh badan yang menarik berbanding dengan kebanyakan orang lain.		ATAU	Sesetengah orang pula rasa tubuh badan mereka tidak begitu menarik berbanding dengan kebanyakan orang lain.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
4.	Sesetengah orang rasa kekuatan fizikal mereka lebih kuat daripada kebanyakan orang yang sama jantina dengan mereka.		ATAU	Sesetengah orang pula rasa diri mereka kurang kekuatan fizikal berbanding kebanyakan orang yang sama jantina dengan mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
5.	Sesetengah orang rasa amat bangga dengan diri mereka serta dengan apa yang boleh mereka melakukan secara fizikal.		ATAU	Sesetengah orang pula kadang-kadang rasa tidak begitu bangga dengan kemampuan fizikal mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
6.	Sesetengah orang rasa diri mereka antara yang terbaik dari segi kebolehan bersukan.		ATAU	Sesetengah orang rasa diri mereka bukan antara yang terbaik dari segi kebolehan bersukan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
7.	Sesetengah orang memastikan diri mereka selalu melakukan senaman fizikal yang rancak.		ATAU	Sesetengah orang pula sering gagal mengikuti senaman fizikal yang rancak.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
8.	Sesetengah orang rasa diri mereka sukar untuk mengekalkan tubuh badan yang menarik.		ATAU	Sesetengah orang pula rasa diri mereka senang mengekalkan tubuh badan yang menarik.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
9.	Sesetengah orang rasa otot-otot mereka adalah lebih kuat daripada kebanyakan orang yang sama jantina dengan mereka.		ATAU	Sesetengah orang pula rasa otot-otot mereka keseluruhannya adalah tidak begitu kuat daripada kebanyakan orang yang sama jantina dengan mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

10.	Sesetengah orang rasa tidak begitu puas hati dengan keadaan atau kemampuan fizikal diri mereka.		ATAU	Sesetengah orang pula selalu rasa gembira tentang kemampuan fizikal diri mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
11.	Sesetengah orang tidak begitu yakin untuk menglibatkan diri dalam aktiviti sukan.		ATAU	Sesetengah orang pula rasa begitu yakin sekali untuk menglibatkan diri dalam aktiviti sukan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
12.	Sesetengah orang tidak mempunyai tahap stamina dan kecergasan yang tinggi.		ATAU	Sesetengah orang pula sentiasa mengekalkan tahap stamina dan kecergasan yang tinggi.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
13.	Sesetengah orang berasa segan dengan tubuh badan mereka apabila berpakaian secara ringkas.		ATAU	Sesetengah orang pula tidak rasa segan dengan tubuh badan mereka bila berpakaian secara ringkas.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
14.	Dalam situasi yang memerlukan kekuatan sesetengah orang segera tampilkan diri.		ATAU	Dalam situasi yang memerlukan tenaga sesetengah orang lambat tampilkan diri.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
15.	Sesetengah orang rasa tidak begitu yakin dari segi fizikal mereka.		ATAU	Sesetengah orang pula kelihatan begitu yakin dari segi fizikal mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
16.	Sesetengah orang rasa diri mereka antara yang terbaik dari segi penglibatan dalam aktiviti sukan.		ATAU	Sesetengah orang pula rasa diri mereka bukan antara yang terbaik dari segi penglibatan dalam aktiviti sukan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
17.	Sesetengah orang rasa kurang selesa bila berada dalam suasana latihan dan kecergasan.		ATAU	Sesetengah orang pula rasa yakin dan selesa bila berada dalam suasana latihan dan kecergasan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

18.	Sesetengah orang rasa diri mereka diminati orang kerana rupa fizikal atau badan yang menarik.		ATAU	Sesetengah orang pula jarang rasa diri mereka diminati orang kerana rupa fizikal atau badan yang menarik.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
19.	Sesetengah orang rasa kurang yakin dengan kekuatan fizikal mereka.		ATAU	Sesetengah orang pula rasa amat yakin dengan kekuatan fizikal diri mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
20.	Sesetengah orang sentiasa mempunyai perasaan positif terhadap fizikal diri mereka.		ATAU	Sesetengah orang pula kadang-kadang tidak mempunyai perasaan positif terhadap fizikal diri mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
21.	Sesetengah orang lambat mempelajari kemahiran – kemahiran baharu berbanding dengan lain dalam situasi permainan .		ATAU	Sesetengah orang pula sentiasa cepat dalam mempelajari kemahiran-kemahiran baharu dalam permainan .	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
22.	Sesetengah orang rasa amat yakin dalam melakukan senaman dan latihan fizikal yang kerap.		ATAU	Sesetengah orang pula rasa kurang yakin dalam melakukan senaman dan latihan fizikal yang kerap.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
23.	Sesetengah orang rasa tubuh badan mereka tidak kelihatan tegap berbanding dengan kebanyakan orang lain.		ATAU	Sesetengah orang pula rasa tubuh badan mereka kelihatan sangat tegap berbanding dengan kebanyakan orang lain.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
24.	Sesetengah orang rasa diri mereka sangat kuat dan mempunyai pembentukan otot-otot yang tegap berbanding dengan lain.		ATAU	Sesetengah orang pula rasa diri mereka tidak begitu kuat dan tidak mempunyai pembentukan otot-otot yang tegap berbanding dengan lain.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

25.	Sesetengah orang berharap diri mereka dapat lebih menghargai tubuh fizikal diri mereka.		ATAU	Sesetengah orang pula sentiasa sangat menghargai tubuh fizikal diri mereka.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
26.	Jika diberi peluang sesetengah orang sentiasa antara yang terawal menyertai aktiviti sukan.		ATAU	Sesetengah orang pula teragak-agak dan tidak akan segera menyertai aktiviti sukan.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
27.	Sesetengah orang rasa diri mereka sentiasa mengekalkan tahap kecergasan fizikal yang tinggi berbanding dengan yang lain.		ATAU	Sesetengah orang pula rasa tahap kecergasan fizikal diri mereka tidak begitu tinggi berbanding dengan orang lain.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
28.	Sesetengah orang rasa amat yakin dengan rupa bentuk badan diri mereka.		ATAU	Sesetengah orang pula kurang selesa dengan rupa bentuk badan mereka .	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
29.	Sesetengah orang rasa diri mereka tidak begitu cekap dalam menangani situasi yang perlukan kekuatan fizikal.		ATAU	Sesetengah orang pula rasa diri mereka begitu cekap dalam menangani situasi yang perlukan kekuatan fizikal.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)
30.	Sesetengah orang rasa amat berpuas hati dengan diri mereka dari segi fizikal.		ATAU	Sesetengah orang pula kadang-kadang rasa sedikit tidak puas hati dengan diri mereka dari segi fizikal.	
	Sangat benar bagi saya	Agak benar bagi saya		Agak benar bagi saya	Sangat benar bagi saya
	(A)	(B)		(C)	(D)

Appendix G2: The Physical Self Perception Profile (PSPP – English Version)

WHAT AM I LIKE?

These are statements which allow people to describe themselves. There is no right or wrong answer since people differ a lot.

*First, decide which one of the two statements best describes you. Then, go to that side of the statement and fill in the appropriate letter on the answer sheet if it is just "**sort of true**" or "**really true**" FOR YOU.*

EXAMPLE

0.	Some people are very competitive.		OR	Others are not quite so competitive.	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**

Explanation

Since I am not very competitive I would choose the statement on the right side and select answer C, sort of true for me. If I was a very competitive person I would choose the statement on the left side and select A, really true for me.

REMEMBER: FILL IN ONLY ONE ANSWER: A, B, C, or D.

1.	Some people feel that they are not very good when it comes to playing spoils		OR	Others feel that they are really good at just about every sport	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
2.	Some people are not very confident about their level of physical conditioning and fitness		OR	Others always feel confident that they maintain excellent physical condition and fitness	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
3.	Some people feel that compared to most they have an attractive body		OR	Others feel that compared to most, their body is not quite so attractive	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
4.	Some people feel that they are physically stronger than most people of their sex		OR	Others feel that they lack physical strength compared to most others of their sex	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
5.	Some people feel extremely proud of who they are and what they can do physically		OR	Others are sometimes not quite so proud of who they are physically	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
6.	Some people feel they are among the best when it comes to athletic ability		OR	Others feel that they are not among the most able when it comes to athletics	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
7.	Some people make certain they take part in some form of regular vigorous physical exercise		OR	Others don't often manage to keep up regular vigorous physical exercise	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**

8.	Some people feel that they have difficulty maintaining an attractive body		OR	Others feel that they are easily able to keep their bodies looking attractive	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
9.	Some people feel that their muscles are much stronger than most others of their sex		OR	Others feel that their muscles are on the whole not quite so strong as others of their sex	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
10.	Some people are sometimes not so happy with the way they are or what they can do physically		OR	Others always feel happy about the kind of person they are physically.	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
11.	Some people are not quite so confident when it comes to taking part in sports activities		OR	Others are among the most confident when it comes to take part in sports activities	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
12.	Some people do not usually have a high level of stamina and fitness		OR	Others always maintain a high level of stamina and fitness	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
13.	Some people feel embarrassed by their body when it comes to wearing few clothes		OR	Others do not feel embarrassed by their body when it comes to wearing few clothes	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
14.	When it comes to situations requiring strength, some people are one of the first to step forward		OR	When it comes to situations requiring strength, some people are one of the last to step forward	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
15.	When it comes to the physical side of themselves, some people do not feel very confident		OR	Others seem to have a real sense of confidence in the physical side of themselves	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
16.	Some people feel that they are one of the best when it comes to joining in sports activities		OR	Others feel that they are not one of the best when it comes to joining in sports activities	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
17.	Some people tend to feel a little uneasy in fitness and exercise settings		OR	Others feel confident and at ease at all times in fitness and exercise settings	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
18.	Some people feel that they are often admired because their physique or figure is considered attractive		OR	Others rarely feel that they receive admiration for the way their body looks	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
19.	Some people tend to lack confidence when it comes to their physical strength		OR	Others are extremely confident when it comes to their physical strength	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
20.	Some people always have a really positive feeling about the physical side of themselves		OR	Others sometimes do not feel positive about the physical side of themselves	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**

21.	Some people are sometimes a little slower than most when it comes to learning new skills in a sports situation		OR	Others have always seemed to be the quickest when it comes to learning new sports skills	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
22.	Some people feel extremely confident about maintaining regular exercise and physical condition		OR	Others don't feel so confident about their ability to maintain regular exercise and physical condition	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
23.	Some people feel that compared to most, their body do not look in the best shape		OR	Others feel that compared to most, their body always look in excellent physical shape	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
24.	Some people feel that they are very strong and have well developed muscles compared to most people		OR	Others feel that they are not so strong and their muscles are not particularly well developed	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
25.	Some people wish that could have more respect for their physical selves		OR	Others always have great respect for their physical selves	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
26.	Given the chance some people are always one of the first to join in sports activities		OR	Others people sometimes hold back and are not usually among the first to join in sports	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
27.	Some people feel that compared to most, they always maintain a high level of physical conditioniong		OR	Others feel that compared to most, their level of physical conditioniong is usually not so high	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
28.	Some people are extremely confident about the appearance of their body		OR	Others are a little self-conscious about the appearance of their body	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
29.	Some people feel that they are not as good as most at dealing with situations requiring physical strength		OR	Others feel that they are among the best at dealing with situations requiring physical strength	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**
30.	Some people feel extremely satisfied with the kind of person they are physically		OR	Others sometimes feel a little dissatisfied with their physical selves	
	(Really true for me)	(Sort of true for me)		(Sort of true for me)	(Really true for me)
	(A)	**(B)**		**(C)**	**(D)**

Appendix H: Application to conduct research in Teachers Training Institutes under the Ministry of Education

Director
Educational Planning & Research Division
Ministry of Education
Level 1 - 4, Block E8
Federal Government Administrative Centre
62604 PUTRAJAYA, MALAYSIA

UNIT PENYELIDIKAN DAN PERANCANGAN
TERIMA
0 3 APR 2009

Form BPPDP 1
(To be filled only in one copy)
Date Received:

Application To Conduct Research In Schools, Teacher Training Colleges, Education Departments, And Divisions Under The Ministry Of Education

PART A: Researcher's Information *(To be filled by the applicant)*

1. Researcher's Name: (Mr./Mrs./Miss/Dr.)
KEE KANG MEA

2. Identity Card No. 590613-01-5233

3. Correspondence Address
28-1 JALAN 17/105 TAMAN MIDAH

Postcode 56000 City/Town KUALA LUMPUR State

4. Tel. No. 03-91723331 5. Handphone No. 013-3642977

6. E-mail Address keekm@yahoo.com

7. Occupation (Applicable to those who are working)

PART B: Information about the institution you are currently studying

8. Name of institution UNIVERSITI MALAYA

9. Address of institution
FAKULTI PENDIDIKAN
UNIVERSITI MALAYA
50603 KUALA LUMPUR

10. Tel. No. 03-79675015

11. Faculty/Department/Year of Study FACULTY OF EDUCATION/PHYSICAL EDUCATION/2005-2009

PART C: Information about the research

12. Research title
EXERCISE BEHAVIOR AMONG MALAYSIAN TEACHER TRAINEES.

3698001513 1

13. Level of your research (Please mark X in the relevant boxes provided.)

☐ Diploma ☐ B.A/B.Sc/B.Ed. ☐ M.A/M.Ed./M.Sc. ☒ Ph.D/Ed.D ☐ General Study

		Day Month Year		Day Month Year
14. Pilot study dates:	From	130409	to	300409
15. Actual study dates:	From	110509	to	210809
16. Expected date of completion for dissertation/thesis/report		311209		

17. With this, I Kee Kang Mea hereby state that I shall fulfill all conditions ascertained by the Ministry of Education. I assure that **one** copy of my dissertation/thesis/report shall be given to the Educational Planning & Research Division, Ministry of Education through my Head of Department/Faculty once it is completed.

Date 23/3/09.

Researcher's Signature

PART D: To be filled by the researcher's Head of Department/Faculty

I hereby

☑ Support this application

☐ Do not support this application

Comments (if any)

The researcher has given an undertaking that a copy of his/her dissertation/thesis/report shall be given to the Educational Planning & Research Division, Ministry of Education when it has been completed through the Head of Department/Faculty.

Date 23/3/09.

Signature of Head of Department/Faculty

Name Assoc. Prof. Dr. Wan Hasmah Wan Mamat

Official Stamp: Deputy Dean (Higher Degree)
Faculty of Education
University Malaya
50603 Kuala Lumpur

6975001514

2

Appendix I: Letter of Approval from Ministry of Education

BAHAGIAN PERANCANGAN DAN PENYELIDIKAN DASAR PENDIDIKAN
KEMENTERIAN PELAJARAN MALAYSIA
ARAS 1 - 4, BLOK E - 8,
KOMPLEKS KERAJAAN PARCEL E
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
62604 PUTRAJAYA

Telefon : 03-88846591
Faks : 03-88846579

Rujuk. kami : KP(BPPDP)603/5/JLD.3 (113)
Tarikh : 6 April 2009

EncikKee Kang Mea **IC: 590613015233**
28-1, Jln 17/105, Tmn Midah
56000 Kuala Lumpur
WP Kuala Lum

Tuan/Puan,

Kelulusan Untuk Menjalankan Kajian Di Sekolah, Institut Perguruan, Jabatan Pelajaran Negeri dan Bahagian-Bahagian di Bawah Kementerian Pelajaran Malaysia

Adalah saya dengan hormatnya diarah memaklumkan bahawa permohonan tuan/puan untuk menjalankan kajian bertajuk:

Exercise Behavior Among Malaysian Teacher Trainees

diluluskan.

2. Kelulusan ini adalah berdasarkan kepada cadangan penyelidikan dan instrumen kajian yang tuan/puan kemukakan ke Bahagian ini. Kebenaran bagi menggunakan sampel kajian perlu diperoleh dari Ketua Bahagian / Pengarah Pelajaran Negeri yang berkenaan.

3. Sila tuan/puan kemukakan ke Bahagian ini senaskah laporan akhir kajian setelah selesai kelak. Tuan/Puan juga diingatkan supaya mendapat kebenaran terlebih dahulu daripada Bahagian ini sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak dibentangkan di mana-mana forum atau seminar atau diumumkan kepada media

Sekian untuk makluman dan tindakan tuan/puan selanjutnya. Terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

(DR. SOON SENG THAH)
Ketua Sektor,
Sektor Penyelidikan dan Penilaian
b.p. Pengarah
Bahagian Perancangan dan Penyelidikan
Dasar Pendidikan
Kementerian Pelajaran Malaysia

Appendix J: Letter of approval to conduct research from one of the participating Teachers' Training Institute

INSTITUT PERGURUAN
TENGKU AMPUAN AFZAN
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Selangor.

Surat Kami: IPGMTAA/A/144/76/01/Jld.9(82)

Surat Tuan :

Tarikh : 12 MEI 2009

Tuan,

PERMOHONAN UNTUK MENJALANKAN KAJIAN
DI IPGM KAMPUS TENGKU AMPUAN AFZAN, KUALA LIPIS

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Sehubungan dengan itu, pihak Institut ini tiada halangan untuk membenarkan tuan bagi menjalankan kajian yang bertajuk " Tingkahlaku Senaman Di Kalangan Guru-Guru Pelatih di Malaysia (Exercise Behavior Among Malaysian Teacher Trainees)".

3. Sekian untuk makluman dan tindakan pihak tuan selanjutnya.

Terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

(MAZLAN BIN MOHAMAD)
Pengarah
IPGM Kampus Tengku Ampuan Afzan, Kuala Lipis.

s.k. Pengarah
Bahagian Perancangan dan Penyelidikan
Dasar Pendidikan
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